San Joaquin County
California
For the Farmer

San Joaquin County
California

INDEX

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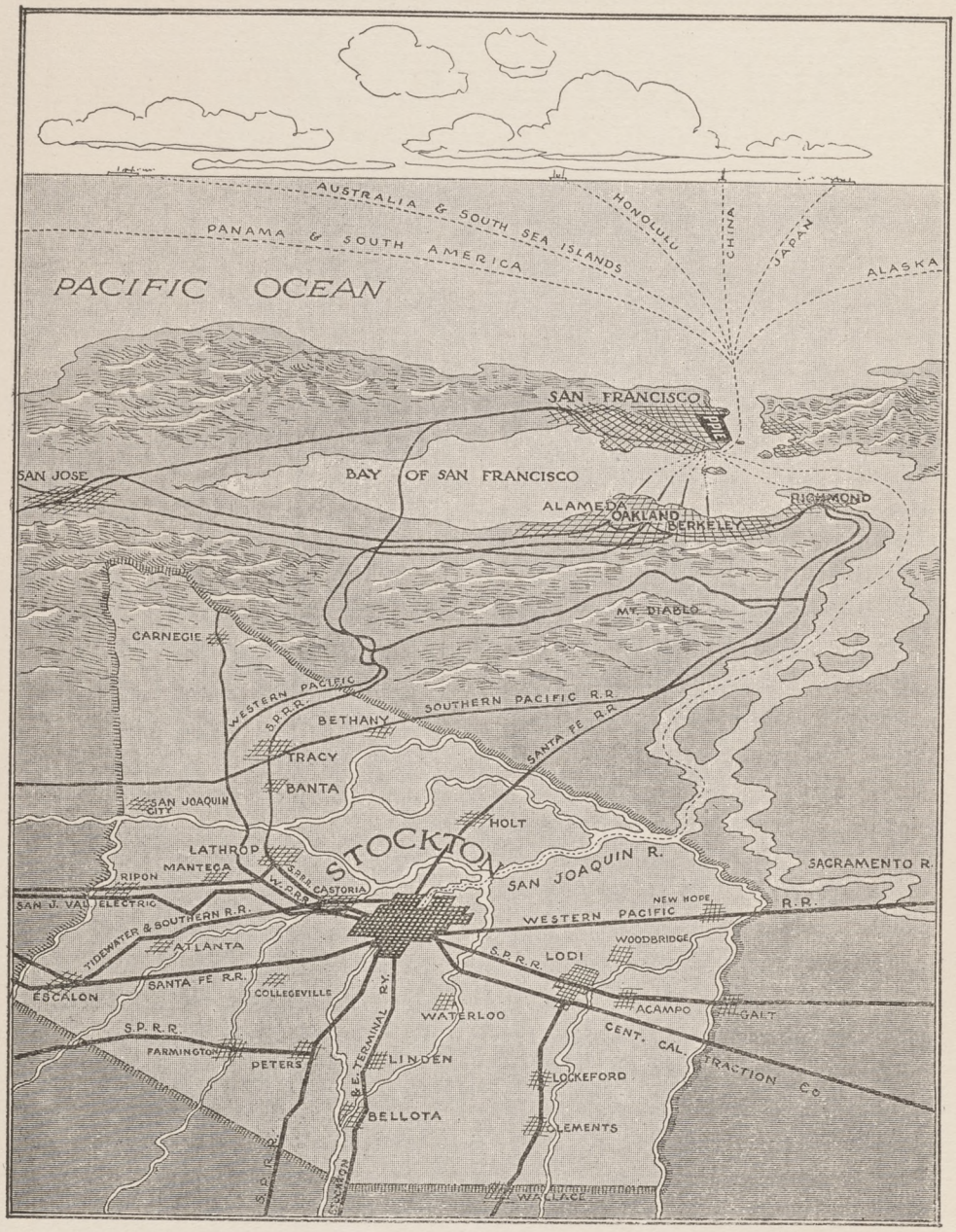


Study this map carefully before reading the book. It will fix in your mind the location, commercial importance and transportation facilities of San Joaquin County. Note carefully the great transcontinental railway lines which criss-cross the county. All northbound trains from the great San Joaquin Valley must pass through San Joaquin County. There is no other pass through the Coast Range from the Tehachapi Mountains to the Sacramento River. Note that the navigable waterways lead directly into the heart of the city of Stockton. Fix in your mind the relative location of population and trading centers, for they will be frequently referred to in the text. As you read the book refer frequently to the map. The reader is thus assured of a very clear understanding of our county.

Introduction

This booklet is intended as a handbook for those who are interested in actual facts relative to San Joaquin County, California. The information was collected by a corps of trained investigators and agriculturists, working under the auspices of the California Development Board, the San Joaquin County Board of Supervisors and the Stockton Chamber of Commerce. Over a year was required for its compilation.

To the merely curious or those who write for information with the sole purpose of obtaining a book of views it will prove a decided disappointment, but to the earnest seeker for accurate knowledge about conditions in California and especially in San Joaquin County it will prove a mine of original and authentic information.

After the facts were assembled and put in typewritten form, the data was submitted for approval as to its accuracy to the San Joaquin County Farm Bureau, an organization of one thousand farmers formed for the purpose of co-operating in an agricultural way with the University of California, and revisions made as directed after a careful and thorough consideration of each feature.

The contents of this book, then, have official sanction as a correct and authoritative statement. It is an accurate, definite handbook which may be followed with unerring trust by any homeseeker, settler or investor, seeking exact knowledge about San Joaquin County.

It is well to bear this fact in mind, however. In each instance where figures have been quoted the *average* is given.

There are many farmers in San Joaquin County whose returns bring much larger figures than the average just as there are others whose farms fail to return the average figure. The success or failure of a farmer depends upon what has been called the "personal equation", which is but another way of saying the intelligence applied to the task at hand.

If there are points that are not clearly brought out a letter to the Secretary of the civic organization in the particular locality concerned, will be answered promptly and truthfully.

San Joaquin County is thickly but not densely populated. There is room for not hundreds, but thousands of industrious settlers, and until the fertile farming sections of the county are put to their fullest productive test, this county will continue to invite settlers and investors.

GENERAL

San Joaquin County, California, lies at the northern and lower end of the San Joaquin Valley. It occupies the center of the State east and west, and the county seat, Stockton, is nearly straight east of the Golden Gate. The county has an average length of forty miles north and south, with a breadth of thirty miles and embraces an area of 926,720 acres.

Two rivers—the Mokelumne and the Calaveras—flow into the county from the east, and a third, the Stanislaus, flows along the southern border. Crossing the county from south to west is the San Joaquin River, which drains the whole southern end of California's great valley, and receives the flow of the above mentioned rivers. Except for the eastern edge and the southwestern corner where the land rises into foothills, San Joaquin County is level and suited to agriculture. Along the rivers are rich sedimentary bottoms adapted to every type of agriculture. It was necessary to build dykes and drain the low tule swamps of the San Joaquin River before they could be cultivated,

but reclaimed this soil is as rich as that found anywhere in the world, and was awarded a prize at the St. Louis Exposition as the richest soil in the world.

Three transcontinental railways cross the county. Besides these main lines, there are branch lines and three interurban electric railways. River boats from San Francisco Bay run to Stockton, the "Gateway City," the entire year. Because of its strategic situation with reference to rail and water transportation, Stockton has had an important manufacturing development. Transportation facilities are a great asset to the farmers of the county, for, being on the main trunk lines, they can ship their products to Eastern points without delay. The markets of the San Francisco Bay district are easily accessible.

The agriculture of San Joaquin County is greatly diversified. The value of all crops of the county as given by the Census Report of 1910 totalled over nine million dollars.

HISTORY

Authority: California State Blue Book, 1911.

Date of Creation

San Joaquin County was created February 28, 1850, and is one of the original twenty-seven counties of the State of California.

Derivation of Name

According to tradition, Joaquin, the Spanish spelling for Joachim who was the father of Mary, signifies "whom Jehovah hath appointed." In 1813 Lieutenant Moraga commanding an expedition in the lower great central valley of California, gave a small rivulet, which springs from the Sierra Nevada Mountains and empties into Buena Vista Lake, the name of San Joaquin, and it is from this that the present river derived its name, which in turn baptized the county.

STATISTICS

Authority: California State Blue Book, 1911.

Land area, 1448 square miles.
County Seat, Stockton.

Population,	1890	1900	1910
	28,629	35,452	50,731

Trees

Apples	5,053
Apricots	53,007
Plums and Prunes	83,641
Peaches and Nectarines	185,073
Pears	13,669
Grape Vines	13,371,794

Land area in Farms, 763,048 acres.
Assessed valuation of the county 1914-15, $60,638,988.

TRANSPORTATION

Railroads

San Joaquin County is traversed in all its small sections by railroads or river boats. The Southern Pacific, Central Pacific, the Western Pacific and the Santa Fe are the transcontinental roads. The Southern Pacific has a branch running to Oakdale and one to Valley Springs, in the hills. There are also the Central California Traction Co., the Stockton Tidewater & Southern, and the Stockton Terminal & Eastern electric roads, all three of which have lines running to Stockton from various outside points.

Service and Rates

This multiplicity of railroads insures good service and low freight rates to all portions of the county. The competing water transportation gives still better freight rates. There are also several launch companies operating on the four hundred miles of navigable waterways in the county, thus affording passenger and freight service for those interested in Delta farms.

Highways

The roads of San Joaquin County would be a credit to any section. There are 270 miles of paved highways in the county, all radiating from Stockton. Not only do these splendid highways give access to every section of the county but they are the beginning of splendid roads into the famous historical Bret Harte gold country, to Lake Tahoe, to Yosemite, to the wonderful Big Trees and to other historically and scenically noted sections of California. San Joaquin is a pioneer county in point of good roads. These paved highways radiate fanlike from the county seat into every corner of the county, following paths that were once romantic trails of the argonauts.

THE SOUTH SAN JOAQUIN SECTION

The South San Joaquin section includes that part of San Joaquin County bounded on the north by the French Camp road to Atlanta; thence east to the county boundary; on the west by the Western Pacific track and the San Joaquin River; on the south by the Stanislaus River, and on the east by the county boundary.

Soil

The soils of this section are sandy loam in character. In some places they run to a heavier loam. The northern edge of the strip from French Camp through Atlanta is heavier than that about Manteca and Ripon. There it is reddish sandy loam with some clay and gravel spots to the northeast of Escalon, but the main body of land is good. Some of this country is underlaid with hardpan at a depth of from three to five feet. Alkali shows in some places, chiefly along the western end of the district. With proper drainage, this alkali can be removed and the land made fertile.

Climate

The rainfall in this section varies considerably. The mean annual rainfall is 13.5 inches. The climate is healthful and well adapted to the production of farm and truck crops. The annual average temperature is 61.4 degrees. The maximum temperature is 108 degrees, reached only once in the last five years. The minimum temperature is 24 degrees, reached only once in the last five years.

Irrigation

This section of the county includes the South San Joaquin Irrigation District. This district, comprising 71,000 acres, is now complete with ample water rights on the Stanislaus River. The ditches are all constructed and the water is being delivered to every sectional forty acres, by the district. Every acre of land in the district is taxed to pay interest and maintenance costs. The district is self-governing, being operated by elected officials. The charge for water assessment and maintenance will average $3.25 per acre per year according to present estimates. The water table under this land is at a depth of six to thirty feet. Plenty of water may be secured by boring. This irrigation district will be found more fully treated under the head of irrigation.

Crops

This land is well adapted to alfalfa, peaches, olives, apricots, figs, citrus fruits, berries, tomatoes, melons and sweet potatoes. Much land in this section will be given over to dairying, poultry and hog raising in connection with alfalfa.

Land Values

Unimproved land in this section sells from $100 to $200 per acre.

Transportation

This section is intersected by four railroads and consequently has excellent transportation connections with the largest cities of the coast. Cream wagons, auto trucks and auto stages have routes all through the district.

Towns

There are three thrifty, fast-growing towns in the district: Escalon, Ripon and Manteca.

General Utilities

Electric power, telephone service and five rural free delivery routes.

FARMINGTON SECTION

Location

The Farmington section surrounds the town of Farmington, close to the foothills on Little John Creek, seventeen and a half miles east of Stockton. The strip of land widens along the creek from the foothills onto the plains as far as Collegeville.

Soil

The soil in this section consists of a chocolate brown to nearly black clay loam with a depth of about thirty-six inches, and underlaid to a depth of six or more feet by a light yellow subsoil of fine silty texture. This soil breaks, cracks and crumbles when dried out. This land is comparatively free from hardpan or alkali and is extremely rich.

Climate

The climate in this section is very mild and equable. The rainfall is fifteen inches per year on an average. The temperature varies from twenty-five degrees to about 105 degrees at the two extremes. Frosts come as late as the first of May but rarely after the first of April. Comparative tables show that the climate resembles that at Porterville, California, in the orange district.

Crops

Although this section is mostly planted to grain, the soil and climate is well adapted to orchard crops, particularly to plums, prunes, walnuts and cherries. Alfalfa and vines are receiving attention.

ELLIOTT SECTION

Location

The Elliott section includes a strip of land two miles wide along the northern edge of the county, beginning about a mile west of the Southern Pacific tracks to Galt and from there back to the foothills.

Soil

The soil is reddish in color, contains much gravel and is underlaid with hardpan at a depth of from one to three feet.

Crops

This land is commonly planted to grain or is used for grazing purposes. There are some vineyards.

Land Values

The cost of land in this section ranges from $50 to $80 per acre.

DELTA SECTION

Location

The Delta lands compose most of the western half of the county. They extend from Old River on the south to the Mokelumne on the north. The San Joaquin coming into the county from the south forks into Old River, Middle River and the San Joaquin River. The Calaveras flows into the latter below Stockton and the two forks of the Mokelumne flow in still farther down. This tremendous Delta country is laced by canals. Some of these canals have been made in reclaiming the land and others are natural. In this county 179,180 acres have been reclaimed and about twenty thousand acres are being reclaimed. All the reclaimed land is dyked with substantial levees constructed with clam-shell dredges. The names of the reclaimed islands in San Joaquin County are Roberts, Union, Victoria, Woodward, the Rindge Tract, Rough-and-Ready, Venice, Staten, Bacon, Mandeville, Mildred, Bouldin, McDonald, Medford, Empire, King, Bishop, Shima, Wright, Elmwood, Sargeant-Barnhart and Smith.

Soils

The soil of the islands is sediment and peat. On all of the newer reclamations, and in fact over most of the islands, it is peat,—that is, soil composed largely of decayed vegetable matter. This peat soil is light and porous. Where the land has been very recently reclaimed, it has the appearance of manure. A sample sent to the St. Louis Exposition was awarded a medal for being the richest soil in the world. This soil is highly productive, particularly for such crops as potatoes, beans, onions, celery, grain, alfalfa and clover. Because of the fact that the land is usually lower than the water surrounding it, the soil is always moist under the surface. The soil of Roberts Island is a sediment loam, on Union Island it is a little heavier still, showing considerable clay. The river lands in the New Hope section are much the same. Along the river west of Lathrop and French Camp the soil is more of a sediment.

Alkali is found in these soils in a few sections where drainage has been neglected. Under proper drainage this is easily and rapidly removed.

Irrigation

Irrigation is always practiced on the islands. The water is turned onto the land by siphon or through a headgate in the levee and the ditches filled, thus sub-irrigating the soil. Water is seldom applied on the surface. All of the tracts have a drainage system, so that after the land is saturated the water can be pumped off. This is obviously a good practice. After the ditches are once made the cost of handling the water is practically nothing.

Crops

Production on the islands amazes the uninitiated. Average yields to the acre are 100 sacks of potatoes, 22 sacks of beans, 250 sacks of onions, 1200 dozen bunches of celery and twenty-five sacks of barley. A sack is the equivalent of two bushels. In many instances the yields go much higher.

Land Values

The land in the Delta is usually rented for $20 per acre, although rent varies from $10 to $27.50 per acre. Grain land is ordinarily rented for one-

third of the crop. Most of the islands are worked by Orientals. Land in the Delta district sells at from $100 to $300 per acre.

Towns

The towns of the Delta section are Terminus, on Sargent Tract; Holt, on Roberts Island, and the Middle River on the Santa Fe.

Transportation

The Santa Fe from Stockton to San Francisco crosses the Delta country and freight can be picked up almost anywhere on that line. The chief method of transportation is by boat through the many waterways. Almost all of the ranches have their own landings where the buyers can come and get the products. This simplifies transportation greatly.

Districts

The whole of the Delta country is divided into reclamations. Nearly every year there are expenses to be met for levee maintenance. The amount of assessment varies in the several districts. Some of the older reclamations are in such shape that assessments are not annually levied. Other tracts are owned entirely by one person or company which meets the expenses of upkeep as it occurs.

LINDEN SECTION

Location

The Linden section lies to the northeast of Stockton. The town of Linden is about twelve miles from Stockton. The district comprises most of the land from within five miles of Stockton to the base of the hills and between the Calaveras River on the north and Mormon Channel and extending over this creek about a mile on the south. The town of Waterloo is at the extreme northwestern edge of the section. Peters is about two miles out of it to the southeast. Linden is in the heart of this district and Bellota is at the eastern extremity where the Calaveras River and Mormon Channel fork.

Soil

The soil is mostly of a reddish brown color. There are two types which blend into one another, in irregular areas. These types are sandy loam and loam. Hardpan if present at all, is at such a depth that it does not interfere with root growth. This section is practically free from alkali. It is surrounded on three sides by adobe soils which project into the area in irregular shapes so that there is no definite line where the change of soils may be said to occur.

Irrigation

This country has no method of irrigation other than water from wells. The water table is at a depth of from fifteen to twenty-five feet. Irrigation has not thus far been largely practiced because of the fact that the country has been farmed to grain. As the new generation comes along, however, the land will be divided and this section will probably go into fruit.

Land Values

This section is one of the richest in the State. The holdings are being sub-divided rather extensively. This land is valued at $200.

Crops

This country is planted to grain, peaches, prunes, walnuts, apricots, cherries, almonds, vines and alfalfa.

Transportation

This section is intersected by several paved highways, and is well equipped with electric power, mail routes, telephones and railroads.

LODI SECTION

Location

The Lodi section includes the land in the north central part of the county, lying within a radius of five miles from Lodi. It includes the land about Woodbridge, Acampo and Christian Colony and extends nearly half way to Stockton.

Soil

The soil in this section is a rich sandy loam of a light, or light brownish color. It is almost free from alkali and what hardpan exists is far enough from the surface so as not to interfere with the roots of the trees.

Crops

This section is now given mostly to the production of fruits and alfalfa. It is the large fruit section of the county. Table grapes, wine grapes, and all kinds of stone fruits, olives, and almonds are produced on a large scale and make up the chief industry of the district.

Land Values

Unimproved land in this section sells for from $150 to $300 per acre, according to location; bearing orchards and vineyards sell for from $300 to $500 per acre. This land is mostly divided up into small acreages and is the most-densely settled rural area in Central California.

Transportation

The Lodi district is well supplied with transportation facilities, the Southern Pacific, Western Pacific and the Electric Traction lines passing through it.

NEW HOPE SECTION

This section is in the extreme northwestern corner of the county.

Soil

The soil varies from a deep sediment loam and heavy dark colored clays to rich peat. Sections along the Western Pacific are spotted with alkali. This alkali land is used for pasture.

Irrigation

The water table is at a depth of about twelve feet at the town of Thornton, but becomes more shallow as one goes toward the river. Most of the district is under irrigation from the Woodbridge ditch, and the balance can be irrigated from pumps.

Crops

Very little fruit has been planted except close to the Mokelumne River. There are some pear and prune orchards. Recently the Woodbridge Irrigation Canal has been extending its laterals into this section and now that the country can have irrigation a large acreage of alfalfa will be planted. Along the river there are several large dairies. Cream is marketed over the Western Pacific at Thornton.

Land Values

Land in this section can be purchased at $100 to $200 per acre.

PETERS SECTION

Location

The Peters district is in the vicinity of the town of Peters, sixteen miles east of Stockton, on the Southern Pacific branch to Oakdale. It is the divide between the valley land and the foothills and lies between the Farmington and Linden sections.

Soil

A strip of land lying about Peters is underlaid by a very impervious hardpan at a depth varying from a few inches to three feet. The soil is reddish in color and contains a good deal of gravel.

Crops

The chief industries are grain, poultry and stock raising.

Land Values

Land in this immediate vicinity sells at $30 to $100 per acre.

STOCKTON SECTION

The Stockton section includes the land north from French Camp to within five miles of Lodi, and east from the Delta lands for ten miles.

Soil

The soil in this section consists of a black clay loam adobe of smooth structure generally free from coarse gritty material, underlain about three feet by a yellow silty subsoil, becoming lighter in the lower part of the section. The surface of the subsoil in the southern part of this section is frequently compacted and partially cemented forming an imperfect hardpan. The same condition will be found in the northwestern limits of this section. Alkali will be found associated with this type of hardpan. These lands have been farmed largely to grain. Very little can be done with the soil when the land is wet or when it is dry. It must be worked in between the two stages. The Italians have also done much with it by heavy manuring which makes it more friable. They have farmed quite an acreage to vegetables about Stockton. Applications of manure and lime are very beneficial to this type of soil in loosening it and making it crumble. Alfalfa, table grapes and walnuts are being planted.

Irrigation

The water table under this section is at a depth of from twelve to twenty feet. It is deeper as one goes toward the east. Water is available for pumping and most of the irrigation is carried on by this method.

Crops

This section is one of the largest grain producing districts in the State. It also produces the best quality of table grapes.

Land Values

Land sells for $75 to $150 per acre, except close to Stockton, where it brings from $300 to $700 per acre as suburban home or villa property.

Towns

The towns in this section are Stockton, Collegeville, French Camp and Waterloo.

Transportation

Paved highways cross the section in several directions as do also three transcontinental railroads and three interurban electric lines, besides main roads and power lines.

TERMINUS SECTION

Location

The Terminus section surrounds the small town of Terminus, on the mainland, but in the Delta section. It is about twenty-four miles northwest of Stockton and fourteen miles west of Lodi. It is located at the junction of the Mokelumne River and Potato Slough. Terminus is the postoffice for Staten Island and a large section of the Delta land in the northern part of the county.

Transportation

There is a boat landing in Terminus. About fifteen boats a week make stops and water transportation with Stockton is good. The soil is a rich black peat.

WEST SIDE SECTION

Location

All that part of San Joaquin County lying on the west side of the San Joaquin River and south of Old River is commonly called the West Side. It includes the towns of Bethany on the north, Tracy and Banta near the center, and Vernalis on the south.

Topography

This land slopes abruptly from the hills to the river,—the fall being at least twenty feet to the mile.

Soil

The soil on the west side varies from a sandy loam to black clay loam. In some places it is genuine adobe. There are also strips of gravelly soil along the foothills. The soils have a great depth and are practically free from hardpan. They are also free from alkali. This land is considered excellent for grain production. The entire farming country is devoted to grain. Most of the land is owned and farmed in large acreages.

Climate

The climate of the West Side is somewhat different from that of the rest of the county. Here the rainfall averages 10.5 inches per year. The temperature is about the same as on the other side of the river.

Irrigation

This land would be very productive if put under irrigation. Near the river the water table is about twenty-five feet from the surface but near the hills it is two hundred feet to water. The water does not lie in a sheet under the ground but in streams, presenting an irrigation problem that has not been solved. A district is in course of formation to bring the water over the land from Old River by a series of lifts. At present the only system of irrigation on the west side is a private one which takes water from Old River and irrigates some of the bottom lands just north of Tracy.

Land Values

The land on the West Side sells for from $75 to $100 per acre where water is not available and in one or two instances where water has been applied is held at $150 to $300 per acre.

Foothills of the West Side

The foothills are used for grazing, with considerable hay land. There are spots in these hills worth farming, but as a rule the soil is too shallow and the land is devoted to cattle and sheep grazing.

GOVERNMENT LAND

Authority: Report of the State Board of Agriculture, 1912.

Number of Acres

There are 20,004 acres of government land in San Joaquin County.

Description

This land is described by the government as mountain land and is situated in the Coast Range Mountains in the southwestern corner of the county.

SOIL TYPES

There are four distinct types of soil in San Joaquin County; the peat of which there is a large area, the adobe of which there is also a large area, the sandy, and the sedimentary loam. These types blend with one another and run together gradually so that with the many modifications there is a great deal of difference between soils even on neighboring lands.

The peat soils are very rich, moist and productive. They are used largely for truck crops. The adobe soils are very fertile but are more difficult of cultivation. They are used largely for the production of grain.

The sandy soils require much moisture and are easily worked and very productive. They are lacking in strength and will not stand continuous annual cropping without fertilization. They are used largely for alfalfa, dairying and poultry.

The loam soils are considered the most desirable because they have considerable body and are at the same time easy to work. They are used largely for fruit production.

Alkali and Hardpan

Hardpan and alkali are found in some parts of the county and should be guarded against although they are not detrimental over very large areas.

IRRIGATION

Development of Irrigation

San Joaquin County has been largely farmed without irrigation until the last few years. The increased yields from the soil which have followed as a result of the application of water in certain parts has resulted in the boring of wells and the installation of pumping plants all over the county. Two municipal water districts have been formed in the southeastern part of the county and two private canal companies, one known as the Woodbridge District and the other for the purpose of irrigating an acreage in the bottom lands just north of Tracy.

South San Joaquin Irrigation District

The South San Joaquin Irrigation District, with headquarters at Manteca, has an extensive water right on the Stanislaus River.

This district has been formed under the Wright-Bridgford Act. Directors are elected from among the farmers themselves. Every acre in the district is taxed to help pay the interest and maintenance cost. The district includes 71,050 acres. It is difficult to estimate just what the tax will average but it is generally estimated that it will be about $3.25 per acre per year. This district is the only one delivering water to each forty-acre unit and is considered the best-equipped and most-complete district in the State. The acreage charge for water includes the interest and sinking fund on the forty-year bonds and hence will progressively decrease. The land is of a sandy character.

Much improvement work is going on at the present time, and a great deal of land is being planted to alfalfa.

Oakdale District

The Oakdale Irrigation District with headquarters at Oakdale in Stanislaus County has a similar water right on the Stanislaus River and is incorporated under the same laws and operated in the same manner.

This district and the South San Joaquin District united in building the headgates and diverting dam. The canal of one diverts on one side of the river and that of the other on the other side of the river. The Oakdale District will irrigate about 9,280 acres in San Joaquin County. The tax in this district will be $2.50 per acre according to the present estimate.

Woodbridge District

The Woodbridge Irrigation Canal diverts its waters from the Mokelumne River at Woodbridge. This is a private company and the water is sold to the farmers at a sliding scale of prices, the cost depending on the number of acres irrigated and the crop to be irrigated. But the price is approximately $3 per acre per year. This company is at present irrigating something like 20,000 acres, mostly in the Woodbridge and western Lodi sections and extending west in the New Hope District and south to within six miles of Stockton.

New Projects

Another project of an entirely private character and connected with a land-selling company is planned north of Tracy. The land to be irrigated is being sold for $300 per acre.

A district is being formed for irrigating the West Side lands. The water will be pumped from Old River and carried to the high lands by a series of lifts.

Pumping Plants

Much land in the county is irrigated from pumping plants. This is practical in all sections of the county except the West Side, the New Hope section and the foothills. The water table varies in depth from twelve feet on the west to about twenty feet along the east. Electric power is available over most of the county. There is a difference of opinion as to the most economical method of pumping, some experienced farmers favoring the gas engine as more economical although less convenient than electricity.

Depth of Wells and Cost of Installation

The cost of boring a ten-inch well to a depth of 100 feet, including the casing, is $136. A ten horsepower motor and four-inch pump with connecting pipe costs $500 more. This makes a total cost of $636, not including the cost of labor and installation. Such a plant is capable of pumping enough water to irrigate six acres of alfalfa in a day, provided there is plenty of fall to the land.

Cost of Power

There is a minimum charge of $6 per horsepower per year in this section. On a pump of the above size, the charge is three cents per kilowatt, which would approximate $1.25 for a ten-hour run. Generally speaking, the cost of irrigating from wells amounts to about $3.50 per acre per year, depending on the nature of the soil, the kind of crop and the head of water available.

Sub-Irrigation

Another method of irrigation obtains in the Delta region. Here the land is sub-irrigated. Small ditches are run across the field and are filled by turning the water in from headgates in the levee or by bringing it over the levee through a siphon. After the ditches are once constructed, the cost of irrigation is at a minimum.

Remarks

Large acreages are being continually put under irrigation in San Joaquin County and the great grain fields are being divided up and planted to fruits and alfalfa.

CLIMATE

Variations in Climate

The climate of San Joaquin County is well adapted to the different phases of farming. There are no marked changes of temperature between the night and the day or between the summer and winter. The changes are mostly of a gradual character and are much less trying on the tender crops than a more varied climate. There are two seasons, the rainy and the warm, or growing season. Thunder showers and frosts are rare, as are also snows.

Rainfall

The rainfall in different parts of the county varies. At Tracy, on the west side, the average is about ten inches per year. At Lodi, in the northern part of the county, the average is from eighteen to nineteen inches, and through the central part about sixteen inches per year. There are dry and wet years, just as in all other sections.

Frosts

The mild character of the climate is evidenced by the very great variety of crops produced successfully in the county. Oranges, lemons, olives and almonds, all of which are particularly sensitive to climatic conditions, are grown and bear abundantly. Occasionally frost causes damage to these tender fruits, but generally the climate is well adapted to most fruits and vegetables and pleasant to live in. The frost danger period is from October 15th to April 1st.

Winds

The prevailing wind is from the northwest. Over most of the county it is a pleasant breeze. On the west side, however, and across the southern part of the county it develops into a stiff wind during the early spring.

Fogs

Over the islands and in the vicinity of Stockton there is a month or two in the winter when fogs are of common occurrence. These are usually cold and disagreeable while they last, but are never of long duration.

Temperature

Record taken at Farmington, San Joaquin County. Altitude 11 feet.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1909—Max.	68	67	67	83	100	103	102	104	103	90	77	61
Min.	29	34	36	46	56	55	59	57	53	38	30	28
1910—Max.	59	61	74	88	104	102	106	102	95	94	80	68
Min.	22	25	38	44	47	50	56	56	49	47	34	27
1911—Max.	63	61	80	77	95	98	106	96	90	88	75	62
Min.	26	28	44	34	48	57	63	55	50	44	28	19
1912—Max.	65	72	72	77	100	103	103	103	98	96	77	66
Min.	27	27	33	40	54	60	64	69	59	46	31	20
1913—Max.	64	65	80	92	92	..	108	106	..	94	76	72
Min.	14	34	35	43	52	..	60	60	..	46	32	28

Record taken at Stockton, San Joaquin County. Altitude 23 feet.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1909—Max.	67	67	67	84	95	102	100	96	96	84	74	57
Min.	32	36	36	40	42	40	52	50	47	40	28	26
1910—Max.	58	60	74	89	102	100	101	98	92	90	70	62
Min.	25	28	40	38	43	45	48	50	45	42	32	26
1911—Max.	64	58	80	77	91	94	98	94	88	86	84	62
Min.	30	31	40	37	40	46	51	50	46	41	29	25
1912—Max.	62	70	73	73	95	105	99	98	96	84	68	62
Min.	24	30	34	38	40	49	53	50	50	36	32	20
1913—Max.	62	71	79	90	93	91	108	105	101	92	70	60
Min.	24	28	31	37	42	49	53	53	51	38	31	30

Precipitation

Record taken at Farmington, San Joaquin County. Altitude 111 feet.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1909	8.92	4.51	1.63	....	T	0.03	00	0	T	0.78	1.93	4.32
1910	3.24	2.26	3.70	0.17	0.05	....	0	0	0.50	0.38	0.38	0.94
1911	10.43	2.48	4.22	0.76	0.11	T	T	0	0.05	0.10	0.18	1.09
1912	2.52	0	2.08	1.26	0.26	0.39	0	0	0.93	0.32	0.97	0.85
1913	2.98	0	1.34	0.57	0.35	0	0.15	T	0	0	2.96	3.19

Record taken at Farmington.

Year	Inches Snow	Rainy Days	Clear Days	Partly Cloudy Days	Cloudy Day
1909		65	237	64	64
1910		43	255	57	53
1911		48	261	22	82
1912		39	238	82	46
1913	T	39	259	50	56

Record taken at Stockton, San Joaquin County. Altitude 23 feet.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1909	7.65	3.87	1.26	0	0	0.03	0	0	0.07	1.06	1.56	4.82
1910	2.04	1.47	2.66	0.13	T	T	0	0	0.40	0.21	0.17	1.31
1911	11.32	1.41	4.24	0.66	0.21	T	0	0	0.29	0.03	0.18	1.16
1912	2.56	0.16	1.57	1.54	1.32	0.25	0	0	1.39	0.44	0.62	0.24
1913	2.40	1.04	1.16	0.35	0.70	0	0	0	T	T	3.14	3.29

Year	Inches Snow	Rainy Days	Clear Days	Partly Cloudy Days	Cloudy Days
1909		66	241	56	68
1910		40	268	55	42
1911		49	263	60	42
1912		54	237	79	50
1913	T	51	249	64	50

Temperature

The temperature here ranges from 20 to 110 degrees as the minimum and maximum. These are the real extremes and neither may be reached during a period of several years. There are usually a few days in each year when the temperature drops below the freezing point and when frosts occur. During the summer the weather is quite warm although not as hot as it is either north or south of the county, on account of the ocean breezes which tend to temper the extreme heat and make the growing weather more comfortable. During the summer the temperature in the heat of the day ranges from seventy to one hundred degrees. The summer night temperature is always sufficiently tempered by the ocean trade winds to insure a comfortable night's rest.

PRODUCTS OF SAN JOAQUIN COUNTY

ALFALFA

Authority: Eugene L. Wilhoit, Stockton; C. T. Wiggins, Manteca.

Sections

The sections of San Joaquin County adapted to alfalfa comprise practically all the upland, except the foothills in the extreme southwestern corner and those along the eastern border. From these foothills extending out a distance of four or five miles onto the plains, there is a strip of land unsuited to alfalfa because of the lack of depth of the soil. This shallow land begins on the south a little south of the town of Farmington and extends north to the county line, leaving out and excepting the narrow strip of bottomland about Farmington on Little John Creek and Bellota, and another on the Mokelumne at Clements, but including a wide strip about Peters. On these lands the soil is gravelly, lacking in humus and shallow. Another piece of land ill adapted to alfalfa growing is that found on the lower Delta where the water stands too near the surface. The higher lands produce good alfalfa crops.

Soil

Alfalfa does well on a great variety of soils. In fact, if the soil has a depth of four feet without either hardpan or standing water or too great an alkali content, it is sure to produce alfalfa if water is available. After once started

it will tolerate a considerable amount of alkali. Light and heavy soils alike produce alfalfa. On the former, the tonnage may be a trifle greater, while on the latter where there is good drainage, the life of the plant may be a little longer.

Climate

Alfalfa produces the largest crops where there is plenty of sunshine and hot weather. It will stand any amount of cold weather in the winter and come out again in the spring. The young plant, however, just after it germinates from the seed and before it acquires the first three leaves, will be killed if caught by a frost. After that period there is little danger.

Land Values

Land suitable for alfalfa can be bought in this county for from $60 to $300 per acre. In some instances, even higher prices are asked. Most of the land is priced from $100 to $200 per acre.

In the southeastern part of the county where a large irrigation district has been formed and where will be the great alfalfa section of the county, land is at present selling for from $125 to $200 per acre, but here the price is rapidly advancing.

Island land suitable for alfalfa can be bought for from $125 to $200 up. The adobe lands to the east of Stockton sell for from $60 to $150 per acre. Lands on the west side of Tracy south sell for from $75 to $100 per acre.

Irrigation

Irrigation is necessary to produce the maximum yields of alfalfa. The common practice is to irrigate after each cutting. Water is obtained either from wells and pumping plants or from irrigation canals. Water in either case costs the operator about $3.50 per acre for the season except on the islands. This varies on different ranches as much as fifty cents either way, according to method and facilities. The cost of applying the water also varies considerably but on heavy land it amounts to about ten cents per acre for each irrigation. On the sandy lands the cost is about twenty-five cents for each irrigation. The cost is lower where a large head of water is available than where there is only a small supply.

Drainage

Drainage is necessary in the heavy adobe lands. Alfalfa will not stand water near the roots and the success of the crop in this kind of land depends largely on this one feature. Alfalfa is very easily drowned out unless precautions are taken, to maintain the water table at a fairly constant level.

Fertilizing

Fertilizing is the practice on the light sandy soils among the successful farms and its effect is evident from the increased yields. Superphosphate is applied once a year at the rate of about three hundred pounds to the acre. It sells on the market for about $18 per ton. On the heavier land an occasional application of gypsum or hydrated lime tends to stimulate and crumble the soil so as to produce heavier yields. This is not a common practice on the heavy lands, but is worthy of more consideration. The gypsum is applied at the rate of three hundred pounds to the acre and sells at about $9 per ton.

Cost of Starting

The cost of getting started depends largely upon the land and the availability of water.

Leveling and checking, which is the principal item of cost after the land has been acquired, differs greatly on several types of land. Generally speak-

ing, the adobe lands are almost level and one does not need to haul the dirt very far, while on the lighter soils more leveling is required. On heavy land, the cost of leveling, checking and ditching averages about $20 per acre.

About one headgate per acre is required. These cost, if the material is wood, about $1.75 each; if of concrete, about $4.80 each.

Seed costs sixteen cents per pound, fluctuating with the season, and about twenty pounds per acre is usually sown, making average cost about $3.50 per acre.

The cost of drilling is forty cents per acre. One man with two horses will drill ten acres per day. Therefore the total cost of planting alfalfa on heavy land is, under average conditions, as follows:

Leveling	$20.00
Headgates of wood	1.75
Seed (20 lbs. at 16c)	3.60
Drilling	.40
Total	$25.75

Harvesting

Harvesting begins in April or the first of May and continues into September and possibly October, according to the season. The hay is cut just as the blossoms get far enough along to give the hay a bluish tint.

One man with two horses will cut eight acres per day. The hay is not allowed to dry for any length of time before it is raked. In hot weather the rake follows the mower about a half day behind. One man with two horses will rake from sixteen to twenty acres per day, or about as much as two mowers will cut.

The hay is allowed to lie a short time and then is put into the shock by hand. One man will shock as much as a mower will cut in a day, or eight acres.

The hay is allowed to cure a day or so in the shock and if buyers do not take it from the fields, it is then stacked or put in the barn. The stacking costs $1 per ton unless done on a large scale.

The mowing costs fifty cents per acre per cutting, the raking twenty-five cents and the shocking twenty-five cents. If one repeats these operations five times the season costs will be $5 and if the seasonal yield is seven tons, the cost of taking the hay off will be seventy-two cents plus the cost of stacking, $1, or $1.72 per ton.

Total Cost of Handling Crop

Water for irrigation	$3.50	
Labor applying water at 25c per irrigation	1.25	
	$4.75 or	.68 per ton
Harvesting and stacking		1.72 "
Total		$2.40

Yield

In San Joaquin County it is the common practice on the heavy lands to cut alfalfa four, and possibly five, times. On the sandy lands it is cut five times and possibly a sixth time. The yield for the first two or three cuttings is usually heavier than later in the season. On the heavy land, the yield is from five to seven tons to the acre per year and on the sandy lands from six to eight tons to the acre. Six tons from the heavy lands and seven tons from the light lands is about what one can figure on.

Selling Price

The prices received for alfalfa hay fluctuate with the market. Because very large acreages are now being set out to alfalfa, it is possible that the price will drop.

In estimating the probable returns from an alfalfa crop one should not figure to sell the crop for more than $7 per ton as hay in the field. If baled,

at a cost of $1.75 per ton, it will probably sell for $8 or $9 per ton. Larger profits are made from hay by feeding to dairy cows than from selling. It is usually considered that alfalfa will bring about $12 per ton if fed. The first crop of hay in some localities is foul with weeds, and for this reason sells for a lower price.

Estimated Profits

If the grower receives a yield of seven tons to the acre and sells from the stack at $7 per ton, his gross returns will be $49 per acre. If it costs as we have figured $2.40 per ton to get it into the stack, or $16.80 per acre to handle the crop, then the profits would be $49 less $16.80, or $32.20.

To make a true estimate of profits one must account for taxes, the interest on the investment and the depreciation on the implements, and add on the increased value of the land.

ALMONDS

Authority, S. S. Murphy, Lodi; J. R. Hale, Lodi.

Sections

The sections of San Joaquin County adapted to almond culture are somewhat limited. Almonds produce abundantly and are considered one of the most important crops in the section about Lodi, and for about five miles in any direction from that town. They have also been grown very successfully in the Linden section and the South San Joaquin section.

Soils

Sandy soil, from fairly coarse sands to sandy loam, is adapted to almonds. They do not tolerate alkali to any extent and should have at least five feet of soil for the roots to grow in. If hardpan is near the surface, it should be blasted so that the roots may reach the soil beneath. They will not stand water close to the surface.

Climate

Climate is an important item in the growing of almonds as they are tender and susceptible to frost. If frost comes after the trees have blossomed, the crop is liable to be damaged. Before blossoming, the buds will stand a temperature of twenty-four degrees, and in full bloom will not be damaged by a temperature of twenty-five to twenty-seven degrees. After the petals have fallen, for a period of about three weeks, the crop is very susceptible to frost damage, a temperature of thirty-one degrees often proving fatal to the season's crop. The trees are usually in blossom during February. In the Lodi section, the crop has been badly damaged twice in ten years. Some varieties bloom earlier than others and these are more apt to be hurt by frosts.

Varieties

There are several varieties and the choice of one for planting is a matter of personal opinion. It is good practice to plant several varieties, at least two, in order to insure the pollination of the blossoms. By planting (alternately in rows) varieties that bloom at different periods, the pollination period is extended and this is particularly desirable with almonds. By this method, if a frost does occur, only part of the blossoms are in the critical stage. The popular varieties are Nonpareil, I. X. L. and Ne Plus of the papershell varieties; and Drake Seedling and Texas Prolific of the heavier varieties. The Nonpareil, Texas Prolific and Drake Seedling varieties are best adapted to this section. A combination of these three varieties in an orchard is excellent. The Nonpareil is earliest, a good bearer and brings the highest price, but it is more apt to suffer from frost and the nuts are light. The Texas Prolific is

also a heavy bearer and is followed by the Drake. These nuts are a little later and heavier in weight but do not bring as high a price as the Nonpareil. A sack of the latter will weigh seventy-five pounds, while a sack of Texas or Drakes will weigh 105 pounds. There is usually a difference of about four cents in the price.

Planting

The orchard should be plowed deeply in the fall and it is good practice to dig the holes at this time. They should be dug a good size, about three feet in diameter by two feet deep. If dug in the fall, the holes receive the benefit of the winter weathering, so that the soil about the roots of the young tree will be in good condition. Of course, before the holes are dug the land should be leveled so that it can be irrigated. As these trees grow in a sandy soil, the item of leveling is sometimes quite a large one, amounting usually to about $20 per acre. Plowing the land will cost $2 per acre and digging the holes about fifty cents per acre. The trees are planted in February. They should be thirty feet apart, or forty-eight trees to the acre. Trees usually cost eighteen cents each ($8.64 to the acre). Two men can set out sixty trees a day and the cost of planting will run $3.20 per acre,—allowing the men $2 per day, the usual wage. Some men are capable of planting more trees in a day, but this work should not be hurried.

Cost of Setting Out an Almond Orchard

Leveling	$20.00
Plowing	3.00
Harrowing	.50
Digging holes	5.00
Trees 48 to the acre at 18c	8.64
Planting trees	3.20
	$34.84 per acre.

Irrigation

The ground should be well filled with water, either by rains or irrigation, up until the last of March. After that it is better to keep what water there is in the soil by cultivation than to irrigate. Summer irrigation or irrigation just before the nuts are hardened keeps the tree green and hulls from hardening. In a dry year it is the practice to irrigate twice in the early part of the season. Operating with a small pump, the cost is about $5 per acre per irrigation, inclusive of cultivation.

Cultivation

Cultivation should be kept up throughout the summer in order to preserve the moisture. A good practice is to plow deeply the latter part of March, and then harrow. After that the land should be given two discings and two harrowings during the season. Such cultivation will cost $3.75 per acre. Always cultivate after each irrigation.

Pruning

The pruning of the almond tree is not a very large item. The practice is to go over the orchard every other year and cut out interfering branches. The water suckers should be removed each year. The cost of the pruning will not exceed $2 per acre per year.

Spraying

Spraying is done during the month of June, if done at all. The enemy of the almond is the red spider, which appears on the under side of the leaf in such large numbers as to suck the life of the tree. When these pests are discovered among the trees the practice is to spray with dry sulphur. Sulphuring is usually done by contract for about sixty cents per acre.

Fertilizing

Fertilizing is seldom practiced in this section. Cover crops or barn-yard manure are good fertilizers. Because of the fact that the almond is a deep-rooted tree some recommend that alfalfa be planted between the trees, after the orchard begins to need fertilizing and that, after this has grown a few years, it be plowed under. The deep root of the alfalfa plant will decay and thus aerate the soil, supplying fertilizer to quite a depth. If alfalfa is grown between the trees it should not be irrigated late in the summer, as the water will prevent the almonds from ripening.

Harvesting

Nonpareils begin to ripen as early as August 20, but the other varieties are usually harvested in September. The nuts are knocked from the tree with poles fourteen to sixteen feet in length. These poles cost three cents each. The nuts are allowed to fall upon sheets of canvas each fifteen to thirty feet, two being placed under the tree at a time, thus making a thirty-foot square. These sheets cost $25 to $30 per pair.

The nuts are poured from the sheets into lug boxes and hauled to a hulling machine. The hulling machine costs from $250 to $500. Many farmers do not own their own machines, but hire the work done by neighbors for about one cent per pound. The huller removes seventy-five per cent. of the hulls. The rest of the almonds are spread on tables and sorted. The remaining hulls are removed by women and children. After being hulled the almonds are spread out to dry and are then bleached by being placed in a sulphur house for about one hour. From the sulphur house they are raked into sacks made especially for the purpose. These sacks are heavy, weighing about two pounds, and cost eighteen to twenty cents each. In marketing the almonds the sack is weighed with the nuts, so the price of the sack is more than returned to the farmer.

Cost of harvesting under average conditions for poling is $13.50 per acre and hulling, drying and sulphuring, which form a continuous process, cost one cent per pound.

Time of Maturity

Almond trees begin to bear about the fifth year, depending upon the size attained by the trees. If small at the fifth year the trees will not produce. At seven or eight years old they should bear about one-half ton per acre.

Yield

The yield to be expected is fairly uniform on all the ranches, although there are years when frost damage will be suffered. Ten acres of almonds averaged seven tons each year over a period of ten years. In many instances the yield is larger, but allowing for poor years this appears to be a fair average yield throughout the county.

Selling Price

The price received for nuts fluctuates with the market. In 1914 prices are as follows: Nonpareils, twenty-one cents per pound; I. X. L., twenty cents per pound; Ne Plus, nineteen cents per pound; Drakes and Texas, sixteen cents per pound. The last named varieties weigh about thirty pounds more to the sack. Most of the growers of San Joaquin County are members of the California Almond Growers Exchange, which fixes the price of almonds for the United States.

Price of Land

The selling price of land suitable for almonds in the Lodi section is from $150 to $250 per acre. In the South San Joaquin Irrigation District land is now selling at from $125 to $200 per acre. Producing orchards are held at not less than $500 per acre.

Profits

Full grown trees averaging 1,400 pounds of nuts to the acre at eighteen cents per pound would bring $252, and with all expenses deducted would net $175.65 per acre.

Cost of Production Per Acre

Cultivation (plowing, three harrowings and two discings)	$ 3.75
Pruning	2.00
Spraying (with dry sulphur once)	.60
Irrigation (twice with pump) (if under ditch $8.00)	10.00
Harvesting (1,400 lbs. to the acre)	27.50
Interest on the Orchard $500 at 6%	30.00
Taxes (differs at different places—estimated)	2.50
	$76.35

APPLES

Sections

Some early varieties of apples are grown along the Mokelumne River about Lockeford and Clements and a few along the hills of the eastern edge of the county. Certain varieties are also grown on the Stanislaus River in the southeastern corner of the county.

Climate

The climate of this county is not adapted to the culture of apples, like the climate of the hill and mountain sections to the east of the county. Cold nights give to the apples of the hills and mountains their flavor and color, and this climate feature is lacking in the valley. Apples are not grown commercially to any extent in this county. A few trees, particularly of the early varieties are grown for home use, and for this purpose they do well, giving variety to the family orchard.

ASPARAGUS

Authority: H. W. Ruess, Orwood; Carson Cook, Stockton.

History of Crop

San Joaquin County has been erroneously considered one of the large asparagus producing sections of the State. The success experienced in securing large profits from asparagus fields along the islands of the Sacramento River led to the conclusion that equally good results would obtain on the Delta lands to the west of Stockton. Some 4,000 acres or more were planted to that crop but the results were not gratifying. It was found that the quality of the asparagus grown here was unexcelled but the yield per acre was not sufficient to make the industry profitable. The growers of asparagus therefore become discouraged as to the future of the crop on these islands and much of the acreage has been dug up and probably more will be. Most of the land put into asparagus is located in the lower reclamations in the vicinity of Middle River. Asparagus might be tried out on some of the older reclamations such as Roberts or Union Island with more satisfactory results

Soil

Asparagus has been grown here in a loose, porous peat soil. This soil is composed largely of decaying organic matter and is always cold and moist, which makes it undesirable for asparagus culture. Cold soil does not produce

the large crops that would be received in a warmer silt soil. Being porous the soil permits of the percolation of sunlight which causes the asparagus to flower out before it reaches the surface of the ground. The soils of the upper reclamations which are more sedimentary in character might prove to be better adapted to this crop.

Climate

Warm temperature during the growing seasons is necessary for quick growth. Frosts occuring during the harvest season do not damage the season's crop beyond the day on which the frost occurs.

Varieties

The varieties grown in San Joaquin County are the Palmetto and the Colossal.

Planting

In starting a field of asparagus the practice is to sow the seed thickly in a hot bed, where it is allowed to grow for a year, forming a thick mat of roots. These first plantings are pulled up and the lower roots cut off. The detached root tips are planted in rows ten feet apart and eighteen inches apart in the rows. The roots are placed in the bottom of the furrow about fifteen inches deep so as to allow plenty of material for covering. As the roots grow they lift the soil and will come out of the ground unless properly covered. Soil is thrown over them by the use of a disc, the soil being banked in ridges to the height of ten inches.

Labor

The labor for handling the crop must be at hand throughout the growing season. Continuous cultivation is necessary and the whole field must be cut every day. As this is laborious work and as there is other demand for the laborers at this season of the year it is sometimes difficult to keep help. Japanese, Chinese and Hindoos are employed.

Harvesting

Harvesting begins about the fifteenth of February and continues until the last of June. Every day the field is gone over and the asparagus appearing above the surface is cut at a point as far below the ground as can be reached. Asparagus intended for the cannery must be set on the bank of the river, where it is taken up by the boat from the cannery. Asparagus to be shipped East must be wrapped in paper, to keep off the sun, and packed in crates. Asparagus does not bring returns until the third year. The life of a field is about twelve years. Asparagus in this section produces about forty forty-one-pound boxes to the acre. This is the average. In more favored sections the production is one hundred boxes to the acre.

Prices and Cost of Production

Asparagus sold to the cannery brings three cents per pound for first grade and one cent per pound for second grade, delivered on the river bank of the ranch. About sixty-five per cent. is first grade and thirty-five per cent. second grade. That shipped East is sent in twenty-eight-pound crates and the price depends upon the season. Cost of production is about two and a half cents per pound.

Markets

Markets for the crop are very good. Much of the asparagus is shipped to the East and the transportation facilities for this purpose are of the best. The asparagus from this section goes to the market a month earlier than does that produced in New Jersey, Florida and South Carolina.

BEANS

Authority: F. B. Nims, Stockton.

Sections

Sections of San Joaquin County where beans can be grown are very extensive. They are raised in small quantities all over the county, but the bulk of the crop is produced on the island lands to the west of Stockton. They are usually raised in rotation with other crops such as potatoes, barley and onions, but can be raised one year after another to a greater advantage than can other crops. Little attempt is made to grow them on the adobe soils, but crops are produced on the river bottoms of the Mokelumne, Calaveras and San Joaquin rivers, and Little John Creek.

Scope of Industry

San Joaquin County is the largest pink bean growing section in the State. Eighteen thousand acres are planted to beans and the crop is handled through Stockton buyers. About one thousand carloads are sent out of Stockton each season.

Soil

The soil suitable for beans should be rich and loamy, not too much sand, and without adobe and alkali. The sedimentary moist soil of river bottoms seems best adapted for the purpose.

Climate

The climate should be free from frosts while the beans are in the ground. Wet weather in September when the vines are in bloom is sure to damage the crop. The winds that blow across the island section in the summer and fall offer a great protection from the frost.

Land Values

Island land can be bought for about $200 per acre, and in some instances for $150 per acre. The rental paid for land adapted to beans is usually one-third of the crop, or, if cash is paid, from $15 to $20 per acre.

Preparing the Land

Preparing the land for beans consists first in flooding it so that it will be well soaked and then fallowed by plowing and harrowing. This preparation costs $2 per acre.

Planting

Planting is done about June 10. One man can drill eight acres per day, hence the cost of drilling is about fifty cents per acre. Seed beans cost about two dollars per acre, the practice being to sow thirty-five pounds to the acre.

Cultivation

One to three cultivations with a one-horse cultivator and one or two hoeings are necessary. The former costs from fifty cents to $1.50 per acre and the latter $3 to $6 per acre, an average of $3.50 per acre for cultivation.

Irrigation

Irrigation is not practiced where the land can be kept moist. Usually the one flooding the land gets before the beans are planted is all that is needed, but sometimes the land is sub-irrigated during the summer.

Harvesting

The crop is harvested in October. The roots of the beans are cut by a knife-like cultivator drawn by horses, which slides along under the ground,

cutting two rows at a time. Then the beans are piled and thrashed. The cutting and hauling costs $1.50 per acre and the thrashing twenty-five cents per sack. The sacks cost an average of eight cents a piece.

Yield

The yield varies from fifteen to thirty sacks to the acre. The average is twenty-two sacks to the acre. On one plantation the yield from seven thousand acres was one hundred and fifty thousand sacks, or an average of twenty-one and a half sacks to the acre. A full sack weighs eighty pounds.

Profit

The price received for beans varies from two and a half cents to four and a half cents per pound, with an average of three and a quarter cents per pound. The income figured on an average yield of twenty-two sacks to the acre and an average price of three and a quarter cents per pound is $57.20. The profit to the land-owner is one-third or $19.06, if the land has been rented on a basis of one-third of the crop. The planter's profit is $38.13 less the cost of handling, $18, or $20.13 per acre.

Market

The market for beans fluctuates somewhat but it is not as unstable as that for some of the other island crops. Buyers are close at hand and the beans are usually sold by sample, to be delivered at the river bank. A cannery has been established at Stockton for both pink and white beans, which will prove an encouragement to the growers.

Varieties

The crops produced in this section are mostly the small pink varieties, although there are some black-eye beans raised on the upland and some large white and navy beans grown on the bottom lands. The great commercial bean of the section is the pink.

Future Developments

There is considerable risk in beans because of possible frost, but on the average this is considered one of the best crops on the islands. Beans will always be a big product of this section.

Cost of Production (approximate)

Preparing land (flooding, plowing, harrowing)	$ 2.00
Planting (drilling and seed)	2.50
Cultivation	5.00
Harvesting (cutting and hauling)	1.50
Thrashing 25c a sack—22 sacks to the acre	5.50
Cost of sacks at 8c per sack—22 sacks to the acre	1.76
	$18.26

The above table does not include land rental, which is from $15 to $20 per acre.

CELERY

Authority: T. Baba, Holt; O. Eccleston, Carson Cook, Stockton.

Sections

Celery is grown in San Joaquin on the island land to the west of Stockton, farmed mostly by Japanese in one- or two-hundred acre tracts, and on the Italian garden lands which surround Stockton, and along the Calaveras River bottom, where celery is grown in small acreages in rotation with other vegetables. There are usually about two thousand acres put in celery each year in San Joaquin County.

Soil

The soil best adapted to the growing of celery is fairly heavy sedimentary soil that is easily kept wet. The plant will tolerate considerable alkali. Peat land is not so good as that carrying some clay. A soil that is sub-irrigated and that can always be kept wet is essential. Much of the island land to the west of Stockton is well adapted to celery production.

Climate

The climatic conditions of this county are suitable for celery production. Occasionally the crop is damaged by frost. If frost comes just before the celery is ready to be cut it will be softened and injured. Generally speaking this is a good celery section.

Land Values

The practice on the islands is to rent land for celery production, either on shares or for cash. The cash rental is $20 per acre. When rented on shares the owner usually furnishes the land, implements, work stock and feed, and the seed, the renter furnishing only the labor. The land-owner receives forty-five per cent and the renter fifty-five per cent of the profits.

Varieties

Only one variety is grown in this county, the golden yellow.

Diseases

A disease known as celery blight sometimes attacks the plants and will damage the crop. The remedy is spraying, if the weather is such that the spray solution will not be washed off.

Irrigation

Irrigation is practised throughout the season. The land is flooded before the plants are set out. Small irrigation ditches, placed every eight or ten rows, are filled every other day.

Cultivation

The seed is planted in a seed-bed during the month of February. This seed bed must be so arranged that it can be easily kept wet. It is usually flooded before the seed is sown and sub-irrigated afterwards. The bed must be kept free from weeds, which requires continuous and tedious work, as the grower must pick the tiny weeds from among the celery plants by hand. After the danger of frost is past, between June 14 and July 15, the small plants are pulled, nipped off at both ends and planted in the bottom of furrows. These furrows are made by dragging a home-made implement over the ground, making a wide, shallow furrow and a line for the next furrow at the same time. The furrows are four feet apart and four inches deep. The plants are set four inches apart. After the plants have been growing two weeks an implement known as a crowder is dragged over the land, shoving the dirt away from the plant and killing all weeds that may have started. This operation is repeated during the season when necessary. When the plant has attained twenty inches of growth the crowder is reversed and the dirt banked up about the plants so that nine inches of the plant is under the soil. Covering the plant in this way bleaches it and it is ready to harvest as soon as the plant becomes white. Bleaching usually takes from two to three weeks. The ground should be kept wet up to the last, as this makes the celery whiten faster and keeps back the suckers which start if the land is allowed to dry out.

Seed

Celery seed is imported from Germany and costs on an average of fifteen dollars per pound. One pound will sow ten acres.

Harvesting

Harvesting is done during the late fall and early winter, mostly in November and December. A wheel cutter drawn by two horses cut the roots below the surface so that the plants can be readily pulled. As the celery is taken from the ground the root is trimmed with a knife and the bunches crated in crates furnished by the buyer. Six or seven dozen bunches fill a crate.

Yield

The yield averages eight hundred dozen heads of celery to the acre, but very often runs to twelve hundred dozen per acre. The latter yield is considered an excellent crop. The price varies all the way from fifteen cents per dozen to sixty cents per dozen, with an average price of twenty-five cents per dozen. If the celery sells at all, a profit is usually assured, but there are times when the entire field is plowed under for lack of market.

Market

In this section practically all of the celery is bought by the California Vegetable Union or the Pacific Vegetable Union. The former has an office at Antioch in Contra Costa County, and buys at the market price, furnishing crates for shipping. Because of competing transportation companies, the market is easily reached from this section and buyers are always at hand.

Remarks

Celery production is very profitable at times, but like all other island crops entails considerable risk. Frosts and blight sometimes work havoc. The demand is limited, so that celery cannot be grown in very large acreages without danger of overstocking the market. Generally speaking, however, celery is a good crop for the islands and its production here is one of the assets of the county.

CHERRIES

Authority: Frank Solari, Stockton.

Sections

Cherries are grown in San Joaquin County mostly along the Calaveras River, all the way from Stockton to Bellota; along the Mokelumne and the San Joaquin rivers, and on some of the older reclamations of the Delta. There is considerable land in the county adapted to cherries but not yet set to orchards. There are about 450 acres planted to cherries in this county.

Soil

Cherries require deep sediment soil. In this country the river bottom soils are considered good cherry land. Cherries demand considerable moisture but good drainage is absolutely necessary. Adobe or sandy land is not suited to cherries.

Climate

The climate of this county is well adapted to the growing of cherries. One grower claims that only once in thirty-seven years has his crop been damaged by frost. In that instance, the frost occurred about the first day the fruit was out of the blossom and killed about one-half of the crop. Sometimes rain or heavy wind coming when the fruit is in blossom will damage the crop.

Land Values

Land suitable for cherries can be bought at $200 to $250 per acre. Full bearing orchards sell for $700 per acre.

Planting

Planting is done in February. The small trees should be selected with care. A one-year-old tree on a two-year-old root is the best, but one should make sure that good buds have been used, as the future production depends on the original bud. The small trees can be bought from nurserymen at from fifteen cents to twenty cents each, usually about eighteen cents each. The trees are planted twenty-four by twenty-four feet apart, or seventy-six trees to the acre. The planting in soft soil costs about $4 per acre.

Cultivation

Cultivation consists of a plowing to the depth of three inches followed by harrowing. This costs about $3 per acre, and is repeated at intervals during the summer, if time permits, but Italians, who raise most of the cherries in San Joaquin County, usually prefer to continue irrigating instead of cultivating, a plant which is not generally recommended.

Irrigation

In irrigating one should be prepared to apply water in abundance or not at all. The Italians prepare the land with ditches and apply the water every two weeks, from the first of June to the middle of August. They thus irrigate about ten times at a cost of seventy-five cents per acre per irrigation, or $7.50 per acre per season. Irrigation should stop in time to let the tree go dormant in the fall.

Pruning

After planting, the trees should be cut back to about two feet, and the following winter three to five feet. Branches one or two feet long are left on the main trunk. The third year two laterals are allowed to grow from the main branches left the year before. Thereafter cutting out interfering branches is about all that is necessary except the occasional shaping of the tree.

Fertilizing

Fertilizing is a good practice. The Italians apply barnyard manure when it is available. Commercial fertilizers are also used.

Harvesting

The crop is picked and marketed in the spring and early summer. The cherries are picked into lug boxes and shipped loose, as it is found that they keep much better loose than when packed. The cost of harvesting is about one and a half cents a pound.

Diseases

There are not many diseases and pests affecting the cherry. The red spider, the most conspicuous pest, is controlled by sulphuring. The cherry slug which destroys the leaves is controlled by dusting with lime or road dust. Birds are a serious pest in some places.

Varieties

The most popular varieties are Royal Ann, Bing, and Black Tartarian. The Royal Ann is used for canning purposes, being easy to harvest. A picker can take two hundred pounds of these in the same time that he would pick one hundred pounds of other varieties. The Royal Ann will hang on the

tree until dried up. The Bing is easy to pick and a good bearer, but will fall from the tree if not picked in time. The Black Tartarian is the most delicious cherry and brings the best price. It is the earliest of the three varieties, but it is not as good a shipper as the others.

Yield

The yield depends upon quality of the soil. The trees begin to bear in the fourth and fifth years. In the fourth year a tree should produce from $1 to $2. The life of the tree is about forty years, if properly cared for. The yield is very irregular as compared with some other crops. Full bearing trees will produce from four to five tons of cherries to the acre. The price received for the cherries is apt to fluctuate but the average is about six cents per pound for the table fruit and five and a half cents for the canning fruit.

Advantages

Cherries can be raised only in favorable places where the climate is not too hot and where the soil is suitable. The cherries from this section can be put on the market before those from the mountain sections and the East are ready. The profits realized are large. The crop is fairly regular.

Disadvantages

The disadvantages encountered in raising cherries, difficulty in harvesting because the fruit is small and very perishable; damage by birds which are apt to get part of the crop in localities where there are trees and brush to harbor them. The greatest difficulty is shortage of labor at the time help is wanted and for the short period needed.

Market

Markets are close at hand and easily reached.

CHICORY

Authority: F. C. Brandt, Stockton.

Extent of Industry

The entire chicory crop of California comes from San Joaquin County. For many years a thousand or twelve hundred acres of land on Roberts Island to the southwest of Stockton were planted to chicory each year. The root of the plant is used and has the appearance of parsnip root. It is white in color, has a bitter flavor, and is used as an adulterant for coffee.

Since the establishment of the Pure Food Law the demand for chicory has been greatly diminished.

The land planted to chicory was flooded two years in succession and the growers became discouraged, so that for the last three years, no chicory has been produced. Production depends entirely upon the encouragement given the growers by a local factory which contracts with the farmers to buy their crop at so much per ton.

A firm, also operating as grower, located about eight miles south of Stockton on the land devoted to the crop, buys the green root, dries, roasts, and sells the finished product to the coffee factories in wholesale quantities. There are about five such concerns in the United States. As the market for chicory is very limited and easily flooded, it is only safe to plant a small acreage. About one thousand acres will supply the Pacific Coast demand. It is probable that the chicory factory located here will begin to manufacture the product again and thus encourage the planting of a limited area.

Soil

Chicory will grow in about the same type of soil as that required for sugar beets. A sandy loam is the best. It must be soil that will not bake.

The plant will tolerate a considerable amount of alkali. Chicory is very hard on the soil and, like beets, takes large quantities of plant food away with each crop.

Planting

Chicory is planted in March. The seed is very fine and is drilled in like onion seed, in rows about twelve inches apart. One and a half pounds of seed are required to the acre. The seed is imported from Germany and costs $1 per pound, delivered here. The company which buys the product usually furnishes the seed. Before planting, the land should be put into garden condition, free from weeds and prepared for irrigation. Usually sub-irrigation is practiced. After the seed comes up, as it does immediately, the plants are thinned so as to give space for growing. Weeds must be kept out by continual hand cultivation. This is very arduous labor. The help employed are Japanese, Chinese or Hindoos. The Italians work their own fields. This hand cultivation must be kept up or the plants will become woody or will be killed altogether. It is estimated that one man must be employed for every one and a half acres.

Harvesting

Harvesting begins the last of July and continues through August and September. A specially designed plow is used to stir the soil so the roots can be readily pulled. The roots are then pulled by hand and the tops cut off, after which they are sacked and hauled to the factory. This has been the practice about here, although the crop could probably be handled more economically on a large scale in the same manner that sugar beets are handled.

Yield

The price paid the grower for the green chicory roots is usually $10, sometimes $12, per ton at the factory. The yield is from fifteen to twenty tons per acre.

Cost of Production

The cost of production including the delivery of the crop to the factory is always figured at $50 per acre, although it might be a little greater or less according to the yield. The rental for the land is usually about $15 per acre.

Profits

If the grower receives fifteen tons to the acre and sells at $10 per ton, he gets $150 per acre and his costs are about $70 per acre, leaving a profit of $80 per acre.

Manufacturing Process

The manufacturer having received the chicory roots, cuts them into small pieces and spreads them on a platform to dry. Here the roots lose about twenty per cent. of their weight. The drying takes from three to five days. The dried roots are usually stored away until demanded by the trade when they are ground and roasted and sold at from four and a half cents to five cents per pound.

FIGS

Authority: Wm. Garden, Stockton.

Scope of Industry

Figs are not extensively grown in San Joaquin County. There are a few trees in different parts of the county, used mostly as borders along the roads.

In many instances these do very well and are a source of profit to the owner. The figs are sold on a small scale to local buyers. Some of them are packed in boxes and sold as fresh fruit, while others are sold dry. Figs are, however, not counted a commercial product of the county.

Soil

Figs grow best in comparatively light sandy soil, although they will grow in a large variety of soils.

Climate

Figs do best in a warm climate free from sudden changes of temperature. A sharp change between day and night will cause the Calimyrna and Adriatic figs to split open and sour. This climatic condition occurs over much of this county and is probably the reason why more figs have not been set out.

Irrigation

Since the development of irrigation in the southwestern part of the county where there is light sandy soil more fig trees will probably be set out in that section. The climate and soil there and along the foothills are better adapted to fig growing than in other parts of the county.

Planting and Care

Fig trees require very little care. They need no pruning or spraying, after the tree is once properly shaped. They begin to bear in the fourth or fifth year and are very long-lived. The small trees can be bought for twenty cents each. It is the common practice in sections where figs are grown to plant twenty-seven trees to the acre, forty by forty feet apart. The tree should have the same cultivation and irrigation as other fruit crops.

Varieties

The Calimyrna is the best commercial fig. The Adriatic and the Black Mission are the other varieties grown here.

Yield

Four acres of Calimyrna figs produced this year (1913) five hundred eight-pound boxes of fresh figs, and three tons of dried figs. The fresh figs sell at from thirty to forty cents per box, the box costing five and a half cents. Dried figs bring six cents and its costs half a cent per pound to handle them. Owing to the shortage of help on this place many figs which should have been packed and sold fresh were allowed to dry. The cost of handling the crop cannot be given as it was done at odd times by members of the family.

Land Values

Land suitable for fig growing can be bought in the southeastern portion of the county for from $125 to $200 per acre. It would probably not be advisable to set out fig trees in other parts of the county except for experimental or family use.

GRAIN

Authority: H. J. Thomas, Stockton.

Sections

Grain is raised all over San Joaquin County to a greater or less extent. The country about Tracy is devoted almost entirely to grain crops, and the western part of the county produces large quantities in rotation with

other crops. Very little grain is grown, however, in the Lodi section, which is devoted almost wholly to fruit. The foothills produce grain in small patches but are largely devoted to grazing. The country east from Manteca in the southeastern corner of the county produces less grain because of the light character of the soil. For four miles to the north and northeast of Stockton the land is given over to truck gardening. Over the remaining sections grain is raised in large quantities.

Extent of Industry

San Joaquin County leads every county in California in the production of grain, particularly barley.

Varieties of Grain

Barley, wheat, oats and rye are the chief varieties grown. Some corn and buckwheat are also raised. Wheat was formerly the great crop of the county, but of late years it has given place to barley because the land planted to wheat for so long became exhausted as wheat soil.

The chief varieties of wheat raised are White Australian and Blue Stem, although some Sonora is grown on the drier lands and there are small plantings of Club wheat. These latter varieties are, however, not very popular. Common feed barley is grown. The oats are of the red variety.

Soil

The soils of the county which produce grain most successfully are the heavy adobe, the peat of the islands, and the sedimentary soils of the islands and river bottoms. The heavier rather than the lighter soils are best suited for grain. Shallow soils, which are frequently lacking in humus, found in many places along the foothills, do not produce heavily, nor do the sandy soils in the southeastern corner of the county. There are also spots in many grain fields, noticeable after the land has been plowed, which are lighter colored and on analysis show alkaline reaction. These spots do not produce as heavily as the land about them.

Planting

The common practice in planting grain here is to plow immediately after the first rains, or as soon as the land is workable, to a depth of from four to five inches. Permanent good results would be obtained, however, if the soil were plowed to greater depth. After the plowing, the seed is sown broadcast and harrowed or drilled in. Most of the sowing is done by the first of January. Summer fallowing is not practiced on the adobe or island land, but is almost universally followed on the West Side lands. The seed is usually put through the blue-stoning process to kill the smuts, etc. Seed from distant rather than neighboring lands is preferable.

Cost of Putting in Crop

The cost of planting grain differs according to the methods employed and the scale on which it is done. For instance, if plowing a large tract with a tractor engine and cutting about two hundred inches over twenty-five acres can be turned in ten hours and the plowing will cost at the rate of eighty cents per acre, not counting depreciation. The average contract price for plowing is $1.50 per acre. The following table shows the cost of planting grain per acre:

Plowing	$1.50
Harrowing	.25
Sowing	.10
Seed (barley) 90 lbs. at $1.50	1.35
Bluestoning	.05
	$3.25 per acre.

The practice is to sow about one hundred pounds of seed on the low lands and about eighty to ninety pounds to the acre on the uplands. Seed barley averages in price about $1.50; wheat about $1.85 and oats about $2.15 per hundred.

Harvesting

The harvesting is done by combined harvesters, which cut, thrash and sack the grain as they move across the field. The harvesting is done during the late summer, after the haying. On the uplands the cost is about $1.75 per acre, while on the lowlands the rate is fifteen cents per hundred pounds. The sacks cost ten cents each and one pound of twine which will sew 150 sacks costs forty-five cents. On the upland the cost of harvesting is as follows:

Thrashing	$1.75
Fifteen sacks at 10c each	1.50
Twine	.05
	$3.30

Cost of Haying

Mowing	$ .35	
Raking	.17	
Shocking	.20	includes bucking to hay press.
	$ .72	
Baling two tons at $1.75	3.50	
	$4.22	

Yields

The yields on the different soils are as follows:

	Lowlands	Adobe—River Bottom	Light
Barley	15 to 40 sacks per acre; average 22	10 to 25 sacks per acre; average 15	6 to 15 sacks per acre; average10
Wheat	Very little planted	6 to 15 sacks per acre; average 10	5 to 12 sacks per acre; average 8
Rye	None grown	None grown	4 to 6 sacks per acre; average 5

It will be noticed that the island lands produce the heaviest yields, but here the grain grows so rank that it is often blown down by heavy winds and much of the seed shelled out and lost. This lowland grain is not as high in quality as that taken from the uplands. It is darker in color and apt to be foul, and sells for ten cents less to the sack than does the upland grain. Brewers in the East are this year for the first time beginning to buy island barley and this may raise the price of lowland grain.

Profit

The prices received for upland grain are on an average $1.25 per sack for barley, $1.50 for wheat, $1.60 for oats, and $1.50 for rye.

Market

The markets here are always as good as they are anywhere, because of the fact that this is a grain section and transportation facilities are of the best, reaching all parts of the county. It will be noticed that oats not only yield the heaviest but the average price received is higher than for other grains. It must be remembered, however, that the market for oats is more early flooded than for other grains, due to the fact that the grain commonly fed to work horses in this State is barley.

Yield in Hay

The grain hay yield to the acre is from two to three tons on the lowlands and from three-quarters to two tons on the uplands. The price received

for the upland hay averages $12 per ton for wheat and about $10 per ton for barley. On the lowlands, where the hay is apt to be foul with weeds, it sells for about $2 per ton less than on the uplands.

Disadvantages

Uncertainty of yield is the great disadvantage in grain farming. If an average crop was always assured it would be a simple matter to rent grain land, giving the owner one-third of the crop, the usual custom, and make money. The yield will not pay expenses unless rain comes in sufficient quantities and at the right time. This is the element of risk in grain farming. Of late years the tendency is to cut up the large grain ranches into smaller ranches and, where water is available, either by wells or ditches, replace grain with alfalfa, vines and fruit.

Labor

Hay harvest help is paid $1.50 to $2.00 per day with board. During the grain harvesting the help is paid $2.50 to $3.00 per day with board.

Acreage

The acreage sown to grain in San Joaquin County for 1913 as taken from the records of the County Assessor was as follows:

Wheat	10,160 acres	Barley	290,140 acres
Oats	21,416 "	Rye	8,274 "

Future Developments

Grain and hay production in this county will not show any immediate decrease as in so many of the counties of the State. In fact within the last few years it has shown marked increase. The heavy adobe lands which are found over a considerable portion of this county are well adapted to grain farming and will be the last to give way to such crops as require constant cultivation. Further, improved methods of farming are soon sure to increase the yield per acre, so that the production of grain in this county may be expected to remain one of the chief industries.

GRAPES

Authority: Joseph Peters, Stockton; Rudolph Eberhardt, Waterloo.

Soil

Table grapes do well on both heavy and light soils. They are particularly adapted to the heavy black lands found throughout a large section of San Joaquin County. On this character of land the yield is large and the grapes bring a higher price than those grown on the lighter lands. However, the black-soil grapes are about three weeks later than those grown on the lighter lands. Grapes tolerate very little alkali; the soil should be well drained and at least three or four feet in depth.

Climate

The climate of San Joaquin County is well adapted to the grape. The crop is subject to damage by frosts if such occur in March and April. While this seldom happens, when it does the fruit buds are killed and the crop may be damaged fifty per cent. Heavy rain in the fall, before the grapes have all been harvested, may start the crop to rotting.

Sections

The sections of the county adapted to table grapes are the same as those adapted to wine grapes and the vineyards of one kind are found beside the

vineyards of the other kind, from the county line on the north to San Joaquin River on the south, and from the edge of the island lands to the foothills.

Some parts of this wide territory are better adapted to grapes than are others. Beginning at a point eight miles north of Stockton and from there north to the county line, including the section about Lodi, Woodbridge and Acampo, is found one of the greatest grape producing sections of the State. The shallow lands along the foothills should be avoided, but most any of the black adobe lands produce a very high quality of table grapes.

Land Values

Unimproved land sells for from $125 to $300 per acre. When in growing vines it brings from $400 to $500 per acre.

Varieties

The table grapes popular here are the Flame Tokay and the Emperor. Muscats and Black Prince are also raised. The Black Prince is the earliest to ripen, followed by the Tokays and the Emperors. The latter are not easily damaged by the rain and can frequently be put on a late market, bringing good prices.

Diseases and Pests

Diseases and pests affecting the grape are not common. There is always the necessity of sulphuring against mildew. The pests known as phylloxera and oakroot fungus have both occurred in the county, but neither are very common. Vines affected should be pulled up and steps taken to prevent the spread of the pest through the vineyard.

In sections where these pests are common the planting of resistant stock is practiced.

Planting

Planting is done in the spring. The land should first be plowed deeply, then harrowed, cross-plowed and harrowed again. This costs $5 per acre. Then the common practice is to buy the rooted vines at $20 per thousand. Cuttings and roots cost only $5 per thousand. These rooted plants are set out nine feet apart, or 538 to the acre. One man can plant in a day's time three hundred of them in heavy land, or five hundred in light land. The vines cost $10.50 per acre and setting them out costs $3.60 per acre. Usually about seventy-five per cent. of the vines make a start and twenty-five per cent. have to be replanted, so one must add twenty-five per cent. to each of the above costs to the expense, or $3.80, making $17.90 the total planting cost.

Cultivation

Cultivation on the heavy lands is much more expensive than on the lighter soils. It consists of plowing, cross plowing and four cultivations. On the heavy soils it is also necessary to go over the land with a clod-smasher after the plowing. The whole cultivation costs about $6.50 per season.

Irrigation

Irrigation is not commonly practiced on the heavy land, although in dry years it is well to apply water. With a small pump this operation costs seventy-five cents per acre for fuel and one dollar per acre for labor. As this is done twice, the irrigation will cost $3.50 per acre per season.

Pruning

Pruning is quite an item of expense with grapes of any kind. It costs a little more to prune Emperors than the other varieties. The viticulturists

usually figure that it costs five dollars per acre to prune and burn brush. Japanese frequently do this work by contract. The pruning is done in January.

Sulphuring

In the spring, when the grapes are about the size of shot, the vines are treated with sulphur. Sometimes this has to be repeated at intervals. The object is to prevent mildew. The cost is about twenty-five cents per acre.

Cost of Harvesting

The vines are gone over carefully several times. There is always a great deal of cutting out of culls, etc. Picking costs differ with the crops but average about fifteen dollars per acre. The fruit is hauled to a packing shed and there packed into crates which cost, with the four baskets, nine cents each. Women packers are paid two dollars per day and average thirty crates per day so that the packing costs seven cents a crate.

Cost of Production

Cultivation	$ 6.50
Irrigation	3.50
Pruning	5.00
Sulphuring	.25
Picking	15.00
Crates—135 crates at 9c	12.15
Packing 135 crates at 7c	9.45
Freight and hauling at 57c	76.95
	$128.80

Yield

The vines begin to bear in the third year. The fourth year they should produce one-half ton per acre. The life of the vine is twenty to twenty-five years. Old vines being deeper rooted are more regular and surer bearers and mature the fruit better than do the younger vines. The yield is usually averaged at two tons of packing grapes and three tons of cull grapes. The latter are sold to the winery.

Selling Price

The selling price received for crated grapes averages about $1.25 per crate of thirty pounds. The price for wine culls averages six dollars per ton.

Markets

The markets are good, as there are several fruit-shipping concerns with houses scattered over the county. These firms buy the grapes and ship them East. It is generally estimated that the cost of freight, loading and commission amounts to fifty-seven cents per crate.

Profits

If the grower gets two tons of packing grapes or 135 crates and a price of $1.25 per crate, he receives $167.75 per acre. The three tons of wine culls bring $6 per ton, or $18 per acre, which makes a total of $186.75. Profits under these conditions are then $186.75, less the expenses $128.80, or $57.95 per acre.

Remarks

Emperor grapes which come on the market nearly a month later than the Tokays bring about twenty-five cents more to the crate. Trouble, however, is sometimes experienced in getting these off the vines where the vineyard is in adobe lands and the rains come early.

It is a common practice to stake Emperor grapes. This is not done with other varieties, except when they are very young. The item of pruning is also a greater one with Emperors than with Tokays.

The grapes produced on the black lands contain a greater amount of sugar and bring about fifteen cents per crate more than those raised on the lighter lands. The black lands are much harder to work and the fruit ripens a month later.

Extent of Industry

Table grapes are one of the largest and best products of the county. There are 16,850 acres of bearing table grapes in this county. Table grape growing will probably continue to be one of the big industries of the county in the future, for conditions here are eminently suited to it.

GRAPES, WINE

Authority: H. H. Aldridge, Woodbridge.

Extent of Industry

Wine grapes are another of the large products of the county, and are considered very profitable. There are 28,682 acres planted to this crop in San Joaquin County, of which 19,450 acres are in bearing.

Varieties

The most popular varieties are the Zinfandel and the Berger. The former variety is the most extensively planted. The Bergers do not come into bearing for a year later, after first planting.

Cost of Planting and Cultivation

The costs of cultivation and planting and the practices are the same as those for the table grapes. These costs amount to about fifteen dollars per acre.

Harvesting

Harvesting takes place in September and October. The cost is about $1.75 per ton for picking and one dollar per ton for hauling.

Yield

The yield averages seven tons to the acre. The price received for wine grapes averages $10 per ton.

Profits

Receipts—7 tons at $10 per ton	$70.00
Expenses	34.25
Profit	$35.75

HEMP

Authority: Carson Cook, Stockton.

Sections

Experiments in hemp production have been carried on for three years on what is known as the Rindge Tract, one of the reclaimed islands of the Delta section. So far no profits have been realized.

The difficulty has not been so much in the growing of the plant as in the handling of it afterwards. The difficulty in securing a machine that will successfully separate the fiber from the stalk has been one of the problems. A drying plant and store rooms are also necessary before one can go into the growing of hemp. It is not profitable to ship the entire stalk to the buyers because of the fact that there are five tons of stalk to one ton of fiber.

Planting and Harvesting

Hemp seed costs about four dollars per acre. It is drilled into the soil and grown similarly to grain. It is harvested with a reaper, laid to one side in piles and allowed to dry. Then it is hauled from the field in the fall and stacked on end near the drying house. After that it is run through the decorticating machine, dried, and the fiber combed out and baled ready for shipment. One is thus unable to realize on a hemp crop for about a year from the time of planting. This makes it a hard crop for the average farmer to undertake.

Yield

The yield per acre ranges from 1,000 to 2,000 pounds of fiber.

Prices

The price received for the fiber delivered in bales on board cars here is from six to eight cents per pound.

Remarks

With the opening of the Panama Canal it is hoped that hemp can be shipped to the East at less cost and that the profit will therefore be increased. Results so far obtained in an experimental way with hemp production on the islands indicate success of the crop in this section.

WATERMELONS

Authority: E. Powers, Manteca.

Sections

Watermelons are produced in commercial quantities about Lodi and in the southeastern portion of the county about the town of Manteca. Formerly the Lodi section was the great watermelon section of California, but of late years the crop has given way in that section very largely to grapes and fruit culture.

Most of the melons grown for shipment in the county now come from the section about Manteca.

The whole of the South San Joaquin Irrigation District is adapted to watermelons. The adobe lands and the island lands are not as well adapted to them.

Soil

The soil suitable for watermelon culture should be sandy loam of some depth, free from alkali.

Climate

The climate should be free from frosts and cold winds from the first of April to the first of June. Hot weather is necessary. Cloudy weather predisposes to cut-worms.

Land Values

The average price of land suitable for melon culture is $150 per acre. Land may be rented for five to ten dollars per acre.

Preparation of Land

Cultivation should begin with a deep plowing (nine inches) in January. This should be followed by shallow plowing in March. The first plowing will cost two dollars and the last one dollar per acre, making the entire cost of plowing three dollars per acre. On the sandy land harrowing is not necessary. Fifty cents per acre is usually allowed for cleaning the land.

Planting

Watermelons are planted the first of April, after the danger of frost is past. Three seeds are dropped to the hill. The hills are placed 9x9 or 10x10 feet apart, according to the richness of the land. The latter makes 435 plants to the acre. To determine the place where the seeds are to be dropped, a marker, a 2x6 plank on runners, is dragged over the land both ways. The marking costs fifty cents per acre.

The seed should be carefully selected, as one cannot depend wholly upon the seed houses for watermelon seed. One pound of seed will plant and replant one acre, and costs fifty to seventy-five cents per pound. Replanting costs fifty cents per acre.

After the plants are up the grower must go over the field and replant hills where the seed did not start. This replanting is accompanied by a hoeing. This is done three times, only one plant being left to the hill. Hoeing and replanting costs, for the three times, $1.50 per acre.

Cultivation

The practice is to cultivate with horse cultivator three times in the season, at a cost of fifty cents per acre. As this is done each way the total cost for cultivation is three dollars per acre.

Sulphuring

The vines are sulphured about the twentieth of May as a preventative of the red spider. Too much sulphur will burn the vines. The cost is twenty-five cents per acre.

Culling

Culling is an important feature in watermelon raising. At no time should there be more than three melons to the vine. Culling begins soon after the melons begin to set in June. Frequently all of the melons are removed at first so that the vine may get a good start. The field must be gone over every week during the season. The cost of culling is five dollars per acre.

Picking

Picking begins about the first of July and continues once a week throughout the season. Picking costs about fifty cents per ton, hauling one dollar per ton, and the loading, which includes placing straw in the bottom of the car, costs fifty cents per ton. The total cost is two dollars per ton to get the melons from the vine to the cars.

Yield

Watermelons should yield about one carload (twelve tons) to the acre. The average price is six dollars per ton on board the cars. This, however, fluctuates greatly. If the weather is hot the melons may bring a high price; if cool it may prove difficult to even give the melons away.

Profits

Profits may be nothing and they may be very satisfactory. The cost of production generally figured is $43.75 per acre and the profits $25 per acre.

Markets

Shipments of watermelons out of this section average about five hundred cars per year. Because of the nearness to the large cities and northern markets melons from this section find no competition from the southern part of the State and farther down the valley.

Disadvantages

The chief disadvantage in growing watermelons is necessity of timely picking. If not handled quickly the vines will die. Unless the demand, which depends largely upon the weather, is good the melons are lost. Even at present about fifty per cent. of the melons are fed to hogs.

Rent	$ 5.00
Clearing the land	.50
Two plowings	3.00
Seed	.50
Marking	.50
Planting	.50
Hoeing	1.50
Cultivating	3.50
Sulphuring	.25
Culling	5.00
	$19.75

The cost of harvesting, using a yield of twelve tons to the acre, would be as follows:

Picking 12 tons at $ .50	$ 6.00
Hauling " 1.00	12.00
Loading " .50	6.00
	$24.00

Labor

Japanese labor is usually employed during the harvest season, pickers being paid two dollars per day.

CANTALOUPES

Extent of Industry

About forty or fifty carloads of cantaloupes are sent out of this section each year.

Cultivation

The cultivation costs and practices are the same as for watermelons.

Harvesting

There is an additional cost in harvesting cantaloupes, for these must be crated at a cost of six cents for the crate and twelve cents for the crating, or a total of eighteen cents per crate. The melons must be picked every day or the vines will die.

Yield

A good average price for cantaloupes is seventy cents per crate. They may bring as high as $1.50 per crate, or there may be no market for them at all. Large quantities are fed to hogs.

OLIVES

Authority: E. Booth, Superintendent of Ehmann Olive Co., Acampo; W. W. Fowler, Ripon.

Sections

The sections of San Joaquin County adapted to olives are quite extensive. The only drawback to olive culture here is the fog which occurs over a large part of the county, causing a great deal of black scale. There are trees all over the county which do well, and back along the edge of the foothills and in the foothills there are many sections excellently adapted to olives where the black scale does not occur.

Most of the land about Lodi and the entire southeastern corner of the county from French Camp Road to the river is well adapted to olives. The island lands are not suitable because of the wet ground and the damp atmosphere. On the west side the strong winds are bad for olives.

Soil

A light soil with plenty of depth is best adapted to olives. However, they will do well on a variety of soils and indeed are grown on most all kinds. If hardpan is present it can be blasted so that the roots can reach the soil beneath. Olives will tolerate more alkali than will most trees. The following table shows the amount of alkali that olives will stand:

Sulphates	.192	Carbonate	.018	Chloride	.042

Climate

Climate is a vital consideration with olives, as they thrive well in a fairly hot section. Damp weather predisposes to scale. A frost or a high wind occurring during the season when the tree is in bloom may destroy the crop. A frost early in the fall before the fruit has been picked will shrivel and damage the fruit, but if rain follows the frost the fruit will swell out again.

Varieties

The varieties grown here are the Mission, which is the standard and most desired by the packers, and the Manzanillo, Escolano and Sevillano. The former is a trifle hardier and resists frost better, but the latter is about three weeks earlier in ripening.

Irrigation

Irrigation is not essential but so greatly increases the yield that it is wise to select the land where water can be supplied. It is not well to irrigate the young orchard heavily but rather let the roots go down to the water. In the old orchard the ground should be kept moist until August. The grove should be irrigated just before blooming time—about the first of May—and then about one month later. In the irrigation district water will cost $3.25 per acre. Applying the water costs sixty-four cents per acre per irrigation. When irrigating with pumps the cost is the same.

Planting

The olive orchard should be planted in the middle of winter so that the dirt will settle about the roots before the trees begin to grow. If blasting is necessary this should be done before the rains come so as to loosen instead of pack the soil in the bottom of the hole. The trees should be planted at least thirty by thirty feet apart, or forty-eight trees to the acre. Some growers even recommend greater distances between the trees. Young trees purchased from the nursery cost from sixty to seventy-five cents per tree. The cost of hauling the trees and setting them out amounts to about seven dollars per acre. Blasting, if necessary, will cost about fifteen cents per hole.

Cultivation

Cultivation should be practiced in olive orchards as well as with other crops. One plowing, one harrowing and four cultivations will cost four dollars per acre.

Pruning

Pruning is the most important of all the details of olive production. The tree will not be a regular bearer unless properly pruned. From the first the tree should be made to grow about five main branches. The center should be kept so thinned out as to allow of good circulation of air and sunlight. Each year about half of the preceding year's growth, which is the fruit-bearing wood, should be cut out.

The pruning should be done after the hard frosts in the spring and before the sap begins to flow, and if done each year and not allowed to get behind the cost will average seven dollars per acre.

Spraying

Spraying is not practiced unless black scale attacks the tree, in which case dry hydrated lime or a solution of distillate water and potash is sometimes applied. Spraying is seldom necessary.

Harvesting

Harvesting begins about November 10. The trees are gone over several times and the large dark olives are taken off. They are picked into buckets and then put into lug boxes and shipped. In some sections more care is exercised. The task of picking olives is laborious.

One man can pick about three hundred pounds per day. After the pickling olives are taken off, the oil olives are either knocked off or stripped off carelessly. Any olives that may have fallen to the ground during wind storms or from careless picking are sold for oil. Harvesting costs fifteen dollars per ton.

Yield

The olive tree begins to yield in the fifth year, when ten pounds to the tree may be expected. By the eighth year forty pounds to the tree is the yield. After that the yield increases from year to year more slowly.

A twenty-year orchard in 1914 averaged 125 pounds to the tree. The producer can count on one ton to the acre. About seventy-five per cent of the crop on a well-cared for place will be used for pickling and the remainder will be sold for oil.

Prices

Prices have not fluctuated very greatly of late, but depend upon the quality of the fruit. In this county olives eleven-sixteenths of an inch in diameter and larger bring $150 per ton, about the average for good olives. Oil olives bring $40 per ton.

Returns

Where one ton to the acre is the yield seventy-five per cent. or fifteen hundred pounds will be pickle olives and twenty-five per cent. or five hundred pounds of oil olives. If the price for pickle olives is $150 per ton and for oil olives forty dollars per ton, the income is $122.50. Subtracting the expense from this leaves a profit of $92.50 per acre. There are times when the percentage between oil and pickle olives will vary greatly from that indicated as the average.

Cost of Starting a Ten-acre Orchard

Ten acres of land at $150 per acre	$1,500
Leveling (depends on condition but will average $15 per acre)	150
Plowing to a depth of 14 inches at $5 per acre	50
Blasting (48 holes at 15c each)	72
Cost of trees—480 at 60c each	288
Setting out trees at $7 per acre	70
Care for first five years until bearing, cultivating, irrigating and pruning at $90 per acre ($16 per acre per year)	900
	$3,030

In the above figures the cost of labor is counted at two dollars per day, the prevailing wage. Blasting is not always required, and on the other hand sometimes costs more than noted here. The cost of leveling depends entirely upon the lay of the land. There are, too, numerous unforeseen expenses ofttimes which cannot be taken into consideration in advance.

Olive production is profitable in this section where the trees have proper care.

Cost of Production

Cultivation	$ 4.00
Irrigation	4.00
Pruning	7.00
Harvesting—allowing one ton to the acre	15.00
	$30.00 per acre.

Advantages

The olive tree is very long-lived, the equipment necessary to handle the crop is relatively small, and the annual outlay is not great. The market is good and steady.

Disadvantages

Olives are comparatively slow in coming into bearing. It is unpleasant and tedious work to pick the fruit. The tree is susceptible to frosts and the trees have a tendency to be irregular in bearing.

ONIONS

Authority: J. A. Fletcher, Stockton; H. W. Ruers, Woodward Island.

Sections

In San Joaquin County onions are grown mostly in the Delta region.

Soil

The soil best adapted to onions is rich silt. Onions do well in the moist peat lands of the islands, but too much water has a tendency to damage them. About 2,000 to 4,500 acres of Delta land are put into onions each year.

Climate

Climate is a serious consideration in onion culture. They will tolerate hard frosts, and winds and warm weather make them grow. The crop must be harvested before the fall rains, as these will soften and take the color out of them.

Varieties

The varieties largely grown are Yellow Danvers and Australian Brown. These are practically the only varieties grown on the islands, but the Big Red onion is largely grown by the Italian gardeners on the high lands near Stockton, although the latter variety does not keep as well as do others.

Planting

On the uplands the planting is done in July in hot-beds, the sets being replanted in November and December. This is for the early onions. On the islands the common practice is to plant in the field in February. This requires about three and a half pounds of seed to the acre. The seed costs on the average seventy-five cents per pound. The planting is done with a drill drawn by hand.

Cultivation

Cultivation, a big item in onion production, is practically all hand work. Weeds must be kept down.

Harvesting

Harvesting begins during the middle of the summer and should be finished before the rains set in. The onions are pulled and laid to one side so that the tops may dry. Then the tops must be twisted off and the onions sacked and hauled to the bank of the river.

Cost of Production

The cost of production is not segregated as to the various operations in the cultivation.

The total cost of producing onions is as follows:

Labor	$ 50.00
Rent	25.00
Seed—3½ lbs. at 75c	2.65
Sacks—250 at 9c each	22.50
	$100.15 per acre.

Yield

Onions yield very heavily. The average is from 200 to 300 sacks to the acre. The prices received are very uncertain, fluctuating from year to year as much as from thirty cents to $2.50 per sack. The average prices received are from sixty-five to seventy-five cents per sack.

Markets

The crop is mostly raised in the reclaimed sections where boats come up to the river bank and take the onions from the growers and to the large marketing cities of the coast.

Profits

The average price obtained for onions for the last five years, including the present high price, is eighty cents per bag. This price makes the industry very profitable. Figuring on an average yield of 250 sacks to the acre and an average price of seventy-five cents per sack gives a gross income of $187 per acre, and a profit of $86.85 per acre.

Rental

Onion growers in San Joaquin as a rule rent the land, as most of the onion land is owned in large holdings. The ordinary cash rental is twenty-five dollars per acre. Another method is for the owner to furnish the land, horses, feed for the horses, and the seed, while the tenant furnishes the labor and the sacks; in this instance the owner frequently agrees to buy the onions delivered on the river bank at a stipulated price of about forty cents per sack. Sometimes the land is simply rented on shares, the owner taking thirty-five per cent. of the crop and the tenant sixty-five per cent.

Remarks

Onions will keep for three months, after which they begin to sprout. It is this feature, together with the wide fluctuations of price that make onion growing somewhat unpopular. The crop may be safely left on the river bank until about November 15, after which the onions must be put into cold storage or in warehouses.

ORANGES

Authority: E. M. McCausland, Lodi.

Sections

Oranges have thus far been produced for the market in only one section of San Joaquin County, the vicinity of Lodi. Here there are two small orchards of seedlings and navel oranges. Scattered trees over the county appear to be thrifty and bear fruit every year. There are also a few lemon and grapefruit trees to which the same applies.

Several small orchards have been set out within the last two years along the Stanislaus River, between Escalon and Ripon, the trees seeming thrifty. Time alone will tell what success will be met with them. Much has been said

about the foothill section to the east of Stockton as prospective citrus land. Comparative tables have been shown to prove that the climate here is about the same as that of Porterville and equally adapted to citrus fruit.

Climate

The climate in San Joaquin County is adapted to the culture of oranges. Oranges require equable temperature, free from radical or sudden changes. A hard frost coming when the fruit is ready to harvest will render it tasteless and of little value.

San Joaquin climate, particularly along the foothills where air drainage is good, is adapted to citrus fruit.

Soil

Oranges do best in a fairly heavy dark red soil, but in this section most of the oranges have been planted in sandy loam of a rather light color. If hardpan is present the holes where the trees are to be set are blasted. Most of the soils of this section are not adapted to oranges.

Yield

The yield has been increasing each year owing to improved methods of cultivation. It is estimated that in 1914 the four hundred trees in San Joaquin County will average nine lug boxes to the tree. Five lug boxes make one packed box. As the four hundred trees cover an area of three and one-half acres, this makes a little over one thousand boxes to the acre. Oranges begin to bear in the sixth year and the yield increases with age. The price received from the local trade is seventy-five cents to $1.50 per lug box, with an average price of one dollar.

Market

The market for the citrus fruit so far produced in San Joaquin County is entirely local, owing to the very limited production. None of the fruit has been packed but is sold in sacks.

Cultivation

The practice has been not to plow but to give several surface cultivations, using a disc plow, harrow or cultivator. The cost of the cultivation is twenty dollars per acre.

Irrigation

Irrigation is continually practiced throughout the summer. The method is to flood the land in small checks, getting the water from a pumping plant. It is estimated that water costs $1.75 per irrigation for one acre and that the labor for supplying it costs eighty cents per acre. As the water is applied five times during the season irrigation costs $12.50 per acre.

About Pruning

Pruning the orange tree is inexpensive. It consists in removing the suckers and occasionally cutting away a little of the inside of the tree where it has become too thick.

PEACHES, APRICOTS AND PLUMS

Authority: J. B. Cory, Acampo.

Sections

Peaches, apricots and plums have been thus far most successfully grown in San Joaquin County in the Lodi-Acampo section.

This section extends for about five miles from Lodi, and includes Wood-

bridge, Acampo and the country to the east of Lodi nearly as far as Lockeford.

The land about Linden is considered one of the best fruit sections in the county, although not extensively planted as yet because of the fact that the large land holdings have not been divided. Peach orchards in this section are said to produce a superior quality of fruit, which is greatly in demand by the canneries.

There is also a good fruit section along Little John Creek in the vicinity of Farmington.

The whole of the South San Joaquin Irrigation District will develop into a good fruit section, particulary for peaches, now that water is available. The adobe and island lands are not considered good for the stone fruits.

Soils

Sandy loam seems the soil suitable for these fruits as indicated by the character of the land on which they have been successfully grown in this county. Peaches stand a large percentage of sand, while plums do better where there is more body to the soil. These fruits will not stand a great deal of alkali or water at the roots.

Climate

Average climatic conditions in this county are excellent for these fruits. Frosts occurring during the latter part of April when the fruit is young and tender sometimes do considerable damage, and a heavy rain during the blossoming period will damage the crop. These, however, do not often occur here. Weather conditions are of vital importance. Apricots are the most susceptible to frost, and for that reason are irregular bearers as compared with the peach and plum, which practically never miss a crop on account of the frost. Frosts do not occur after the first of April.

Irrigation

Irrigation is usually practiced, although there are many instances where the orchards get no water except from rains. The amount of irrigation necessary depends upon the seasonal rainfall. Usually water is applied twice in a season.

In the Lodi section and along the Mokelumne River about Linden pumping plants are used for irrigation while in the Woodbridge section and in the South San Joaquin Irrigation District the water is taken from canals.

The cost of irrigation averages about six dollars per year per acre. This includes the labor and the water, whether taken from canals or pumped. This figure varies somewhat under different conditions, but is not far from an average cost.

Cultivation

The method of cultivation is about the same for each fruit. The usual practice is to plow deeply after the rains, then harrow and cultivate about four times during the season. After each irrigation the land should be cultivated so that it will hold the moisture.

The plowing costs about two dollars per acre, cultivation fifty cents per cultivation, and harrowing about twenty-five cents per acre. The total cultivation costs $4.25 per acre.

Pruning

The trees are pruned while dormant during the winter. The pruning is usually done by Japanese, frequently on contract, and costs ten dollars per acre. The cost is not quite as much with plum trees as with peaches and apricots. All dead wood and interfering branches are cut out and the trees kept shapely and low to the ground. The apricot is allowed to grow much higher than the peach or plum and is a differently shaped tree.

Spraying

The trees are usually sprayed once in a season in this section. If sprayed regularly the trees will always look clean and the fruit will not be wormy. Here the practice is to spray the first of February with a solution of lime, sulphur and salt. This prevents what is known as "curl leaf," keeps worms out of the fruit and kills other parasite pests. To kill the "shot-hold fungus," which sometimes attacks apricots, bordeaux mixture of bluestone solution is used.

The cost of spraying is about six cents per tree.

Fertilizing

Fertilizing, while not practiced to any considerable extent, is well known to produce good results. Barnyard manure is the best fertilizer. Cover crops of Canadian field peas and vetch are sometimes grown between the trees during the winter and plowed under in the spring. Commercial fertilizers are also used.

Thinning

Thinning is one of the most important items in connection with an orchard, and one of the heaviest expenses encountered. It is impossible to estimate an average cost of thinning. Sometimes the cost is very large and at other times it amounts to very little, depending upon the season. The trees are usually gone over and enough of the fruit picked off to leave that on the tree three inches apart. For convenience in figuring, the cost of thinning may be put at six dollars per acre. The thinning is done about the first of May.

Harvesting

In planting an orchard it is well to select varieties that will follow one another in time of ripening so that the work does not all come at once.

Apricots are the first to ripen, the picking beginning about June 20 and continuing for a month. Plums are ready for harvesting about July 1 and the peaches follow, the picking continuing through to October.

From the orchard the fruit is hauled to the packing-shed on the ranch and is there either packed in boxes for shipping or cut for drying. Fruit that is to be canned is hauled direct to the station and shipped to the cannery.

Yield

The yield from peach, apricot or plum orchards varies greatly with the season and only an average can be given. Full-bearing peach trees should produce at least two hundred pounds of green fruit to the tree, which would mean about thirty pounds of dried fruit.

The peach is the most regular bearer of all. Canning peaches do not bear so heavily as drying peaches, although the difference is not great.

Apricots yield about 150 pounds of fresh fruit, or twenty-five pounds of dried fruit to the tree.

These fruits begin to bear in the fourth year and can be counted on for a crop the fifth year.

Markets

The markets are good because of easy transportation and the fact that cannery representatives, green-fruit shippers and dry-fruit buyers are always on the gound going among the ranchers to buy their crops.

The green fruit is packed in boxes and shipped East.

The market for dried peaches has not been very satisfactory for the last three years and it has been necessary in many instances to hold them over a year in order to get a profitable price.

Dried apricots sell quickly and at a good price. Prunes have also brought good prices for the last year and canning fruit is always in demand, with a fairly stable price.

Land Values

Land suitable for peaches, apricots and plums sells for two hundred dollars per acre. For full-bearing orchards about four hundred dollars per acre is the average price.

Prices

The price for dried peaches fluctuates. An average would be six cents per pound. Canning peaches bring from twenty to twenty-five dollars per ton. Dried apricots bring from ten to twelve cents per pound as an average price; there is always a market for these. The prices obtained for dried prunes varies according to size of fruit. The basis is three and a half cents per pound for the size that run eighty to the pound. If the prune is large the price is higher and if smaller the price is lower. The prunes grown about here usually average six cents per pound.

Planting

Peach, apricot and plum orchards are planted during January and February. The small trees cost about twenty cents each. The peach and plum trees are planted about twenty by twenty-five feet apart, or sixty-nine to the acre. The cost of setting out the trees is about eight cents per tree.

Cost of Handling Crop

Irrigation	$ 6.00
Cultivation	4.25
Pruning	7.50
Spraying	6.50
Thinning	6.00
Harvesting	25.00
	$65.25

Added to this there is the cost of rental, interest, etc. The profit from this type of orchard varies greatly from year to year, but the trees come into bearing early and bear for about twenty-five years.

PEARS

Authority: T. J. Stephens, Stockton; George F. Buck, Stockton.

Sections

The sections of San Joaquin County particularly adapted to the production of pears are the bottom lands lying along the several rivers that pass through the county, and on the older island reclamations. At present there are about five hundred acres in the county planted to pears. They are located chiefly in the Lodi, Acampo and Thornton sections about Lathrop at the lower central part of the county, on Rough-and-Ready Island, on Union Island, and along the Calaveras River.

Soil

Deep sedimentary soil is best adapted to the growing of pears. Pears will stand a great deal of moisture and the silt-like soils found in river-bottom lands are known to produce the heaviest crops. Adobe soil, while it produces good pears, does not yield as heavily as do the lighter soils. Pears will tolerate more alkali than other trees, the percentages running as follows:

Sulphates..... .111 Carbonate..... .011 Chloride..... .009

Climate

For pears the climate should be warm during the growing season and free from frosts at the time of budding. If a frost comes when the buds are at the tender stage much damage may be done, although not all the buds will be affected, but only those which are at the critical stage.

Cost of Land

Land suitable for pears varies from $150 to $500 per acre, with an average of $200 per acre. It is difficult to find full bearing orchards that are for sale. They sell from $700 to $1,000 per acre if in good condition.

Varieties

The two most popular varieties are the Bartlett, by far the most largely grown, and the Winter Nellis.

Diseases and Pests

The grower has to contend with blight, codling moth and several scales and fungus growths that attack the limbs and branches of the trees. Some years ago blight attacked the pear orchards and did a great deal of damage—so much, in fact, that many of the pear orchards were pulled out. This accounts for the fact that the number of pear trees throughout the State fell off considerably between 1900 and 1910. Of late years the orchardists have learned how to handle the blight and it is no longer greatly feared.

Planting

The trees are set out in March. They are usually planted twenty by twenty feet apart, or 108 trees to the acre. Trees grafted to quince roots will stand more water than will the pear root. The best tree is a one-year-old trunk on a two-year-old root. The cost of small trees is about twenty cents when bought in lots of a hundred. Before planting it is well to blast the soil where the tree is to be set, as this gives sub-soil cultivation that cannot be secured in any other way. If possible it is well to allow the blasted holes to remain open for a time before the tree is set out, as this gives the soil a chance to air out well down. The cost of blasting is about fifteen cents per hole.

Cultivation

Soil cultivation for pears consists, according to the best practice, of plowing and cross-plowing, harrowing and cross-harrowing and frequent cultivations through the season. The plowing costs about four dollars per acre, harrowing about one dollar per acre and cultivation, five times, about $2.50 per acre per year. The plowing begins in January and February.

Pruning

Pruning is done during the winter when the tree is dormant, and the cost is not as great as with peaches. The average cost of pruning pears is about five dollars per acre.

Spraying

Spraying is done twice a year, about December, when bordeaux mixture is used to destroy the fungus growths on the branches, and again when the pear is very small, at which time the lead arsenic spray is used to prevent damage from codling moth. If scales appear a spray of lime and sulphur is used, but this does not occur very often. When blight appears the limb on which it appears must be immediately cut away well below the blight and it must be burned. As an additional precaution the shears with which the limb was cut off should be sterilized. Blight can readily be kept out of an

orchard if these precautions are taken. The cost of spraying is about ten dollars per acre per year. This figure is for two sprayings. The materials cost about six cents per gallon.

Thinning

Thinning may be necessary occasionally, but if one is careful in picking the crop it may be possible to get the benefit of a full crop. Thinning will cost about two dollars per acre.

Irrigation

Irrigation is usually practiced and increases the yield greatly. Two irrigations will cost about four dollars per acre, where the cost of water is three dollars, or power is necessary in pumping.

Harvesting

Harvesting usually begins in July. One can begin to pick as soon as the pears are of shipping size. By going over the tree several times and picking off the largest one may bring all the pears up to good size. Picking costs about two cents per box or, working on a basis of three hundred boxes to the acre, the cost will be six dollars per acre.

Packing

Packing is done usually on the ranch by both women and men. The packing labor costs about five cents per box; the box and the paper cost seven cents per box, so that the whole packing cost is thirty-six dollars per acre. Hauling to the shipping point varies according to the distance; for four miles the cost is two cents per box, or seven dollars per acre.

Cost per Acre of Handling the Crop

Plowing and cross plowing	$ 4.00
Harrowing and cross-harrowing	1.00
Cultivating (5 times)	2.50
Pruning	5.00
Spraying (twice)	10.00
Thinning (not always needed)	2.00
Picking (2c. per box; 300 per acre)	6.00
Packing (5c. for labor, 7c. box)	36.00
Hauling to station, 4 miles	7.00
Irrigation (twice, $3 water, $1 labor)	4.00
Total per acre	$77.50

Besides the table given above the farmer must figure taxes, which will probably amount to about $2.50 per acre, interest, at least twelve dollars per acre, and depreciation, and the fact that the orchard produces nothing during the first four years. Considering all of these items the total cost of the orchard for one year is about one hundred dollars per acre. Of course, in starting the orchard the grower is not put to the expense of handling the crop and spraying, and the cost of pruning is very small until the orchard comes into bearing.

Yield

The yield from a full-growing orchard varies from two to eight tons, or from one hundred to four hundred boxes to the acre. The yield depends on the condition of the season and the care given. The maximum yield on the uplands is not as great as that on the river-bottoms by about two tons. The trees will begin to bear in about the fifth year, but should not be allowed to bear too heavily at first. The sixth year the production will pay costs and the tree will come into full bearing about the eighth year.

Markets

The crop is taken by local green-fruit buyers and the canneries. The two sets of buyers are always competing so that while a grower will pack his

fruit on the ranch and sell it to the shipper one year, the following season he may sell it loose to the cannery. Owing to the splendid transportation facilities in this county the market is exceptionally good.

Selling Price

The prices received depend largely on supply and demand. When sold to the green-fruit shippers they bring from eighty cents to two dollors per box, with an average price of about one dollar per box. The boxes are about forty pounds each. When sold to the cannery the fruit brings from $37.50 to $40 per ton.

Life of Pear Trees

If the tree is well cared for it will live for forty or fifty years.

Labor

The type of labor employed is usually Japanese. The cost of labor is two dollars per day. There is considerable work at harvest time, but because of the fact that this county is situated where all of the paths of the State meet, there is little trouble in obtaining help. The pear crop can usually be harvested slowly, so that the grower has time to handle it.

POTATOES

Authority: J. A. Fletcher, Stockton; Roy M. Filcher, Middle River.

Sections

The bulk of the San Joaquin County potato crop comes from the Delta lands, formed by the many branches of the San Joaquin River, to the west of Stockton. These lands do not all lie in San Joaquin County but the potato crop is mostly handled through Stockton merchants and the conditions under which they are grown are the same throughout the section. Potatoes are also grown on the higher lands about Stockton by Italian gardeners, but on so small a scale that the production does not figure in the market.

Soil

The loose peat soil on the islands is particularly adapted to potatoes. The reclaimed tule land with rich, loose, dark colored soil is always moist and so loose as to allow ready growth to the potato. Potatoes will not tolerate alkali or do well in adobe. Potato production impoverishes soils because of the great amount of plant food taken.

Climate

The climate should be warm throughout the growing season and free from frost. Frost coming after the plant is up is apt to kill the entire crop and make replanting necessary.

The Delta lands while subject to frost are not often affected, for two reasons—first, they are surrounded by water, and second, there is usually a brisk breeze from the west, which is a great protection through the spring and summer.

Land Values

The lower lands where most of the potatoes are grown are usually valued at two hundred dollars per acre. The method of farming potato land on the Delta is different from that in other localities. Here the land is owned in large tracts by capitalists who have reclaimed it and who rent it out for farming to Chinese and Japanese. The renter pays from $17.50 to $27.50 per acre. The price depends on several conditions, for instance, the more recently the land has been reclaimed the higher the rental. Land that is in

beans and barley one year will bring a higher rental the next year than that which has been in potatoes.

Land with alkali spots in it or that is known to carry potato diseases in the soil will not bring as much as the cleaner lands.

Labor

The labor frequently is not performed by the man who rents the land but by others with whom he has contracted on a share basis. Or several men may go into partnership and rent and work the land together. Usually the men in the field have an interest in the enterprise. On the large tracts one man is needed to every seventy-five acres until the time of digging, when more are needed. The laborers are as a rule Chinese, Japanese and Hindoos.

Preparation of Land

New land must first be rolled, the tules burned off, the willows cut out and the ground plowed and harrowed before it is ready to be put into potatoes. This has been carefully estimated to cost ten dollars per acre. The rolling, burning and clearing will cost $3.75, the plowing $5 and the harrowing $1.25 per acre. This cost has of course already been met when one is farming old land, but many feel that the greater the yield and the better quality of potatoes obtained from new land make the extra labor worth while. Potatoes from new land sell for fifteen cents per sack more than those from land previously cultivated. Land that has already been farmed is plowed after the weeds start, harrowed and planted at a cost of three dollars per acre. The plowing can be contracted for $1.25 per acre.

Planting

Planting takes place any time from March 1 to July. The seed potatoes are cut and dropped in the furrow.

Cultivation

The methods of cultivation are entirely new to the planter who never farmed on the Delta, and before attempting to work the land he should have some experience with the next phases which it presents. The ground is very soft and in many cases, particularly on the new reclamations, the horses must be equipped with broad iron shoes, similar to snowshoes, so that they will not mire down.

The soil when dry is combustible, and one must guard against soil fires. Cultivation begins soon after the potatoes come through the ground. Cultivation is a great deal more of an item on old land than on that newly cultivated. Usually the land is cultivated about three times a year at a cost of one dollar per acre for the season. The potatoes are planted in rows twenty-eight inches apart.

Irrigation

The method of irrigating is not the common one of flooding water on the surface, but ditches are filled here and there over the land and the soil allowed to sub-irrigate. The ditches are then drained by an implement made for that purpose. These ditches are placed at every thirty-fifth row and the water is turned into them from a main lateral about twice a week. It is allowed to stand for a few hours and is then drawn out into deeper drainage ditches placed every quarter of a mile. From these ditches it is pumped over the levee into the river. The drainage is not always as carefully handled as outlined here but the land is left in better condition and alkali is not so apt to appear if the water is thus removed.

The small ditches are put in by the tenant and cost about $4.50 per acre.

Each tract of reclaimed land is usually divided into camps, each with its

own irrigation and drainage system. The water is simply turned onto the land through a headgate in the levee until the ditches are full and then it is shut off. The cost of irrigation is at a minimum, usually fifty cents per acre to the planter for the season.

Harvesting

Potatoes are taken from the ground in the fall. The cost of harvesting is estimated on a yield of one hundred sacks to the acre. This is a little above the average yield, but because it is the average over the better lands it is used as a basis for estimates. Digging will cost twenty cents per bag or twenty dollars per acre. The hauling from the field to the river bank costs four cents per bag or four dollars per acre. The bags themselves will average nine cents each or nine dollars per acre.

Seed

Whenever possible the seed used is obtained from outside the State. About eight sacks to the acre are planted and the average price is $1.25 per sack, or twenty-five cents more than the market quotations, a total cost of about ten dollars per acre.

Cost of Production

Rental	$22.00
Plowing, harrowing and planting	3.00
Seed (eight sacks per acre, at $1.25)	10.00
Cultivating	1.00
Ditching	4.50
Irrigating	.50
Digging	20.00
Hauling	4.00
Sacks	9.00
	$74.00

These figures have been carefully worked out and agree with the general estimate that it costs seventy cents per sack to produce potatoes.

Yield

The yield differs greatly, depending upon conditions. On new land one can expect 150 sacks to the acre in good seasons. In some instances the yield goes as high as 250 sacks to the acre, but this is rare. On land that has been farmed to potatoes for some time the yield may drop down to sixty or seventy sacks. The average is from ninety to one hundred sacks to the acre of marketable potatoes. Besides there are a lot of small potatoes which are either sacked and sold as second grade or left in the soil to be eaten later by sheep.

Selling Price

The price fluctuates greatly according to the supply and demand, from thirty cents per sack to three dollars per sack on the river bank. The average price is about one dollar per sack.

Market

The grower hauls the potatoes to the river bank surrounding the ranch and the buyer loads them onto boats and takes them to Stockton, Sacramento or San Francisco.

Most of the potatoes are sold before they are out of the ground. In fact the soil is a good store-house and many growers do not dig their crop until they know what price they will receive. Others dig and store them in a Stockton warehouse. In this case the cost of barging from the levee to the warehouse is six cents per sack. The storage is three cents per sack for the first month and two cents for succeeding months. In case the potatoes are

diseased they may have to be sorted over at a cost of eight cents per sack. There will also be a shrinkage of ten per cent. after they have been stored a couple of months. Clean potatoes do not usually require sorting.

Varieties

The varieties commonly planted are Burbank and American Wonder.

Extent of Industry

The growing of potatoes is one of the largest agricultural industries of the county. About half of the potato acreage of the State is in San Joaquin County. In the year 1913 there were approximately 24,000 acres of land planted to this crop.

Diseases

Potato diseases of various kinds are common and troublesome at times. These diseases get into the land and are carried over from one crop to another unless the land is farmed to other crops in rotation.

QUINCES—POMEGRANATES

Extent of Industry

Italian gardeners in the vicinity of French Camp are small producers of several kinds of fruit in conjunction with their gardening. Among these are quinces and pomegranates. The demand for such fruit is very limited and they can not be raised profitably on a large scale.

Planting

Quince and pomegranate trees are small, resembling large bushes, and are planted close together, about ten by twelve feet apart. They begin to bear in the third year and are very long-lived. The trees are cultivated along with the gardening. They are irrigated frequently and the brush and suckers cut back.

Harvesting

Quinces are sold in fifty-pound boxes for from fifty to seventy-five cents per box. The box costs fifteen cents. Pomegranates are sold in fifty-pound boxes at forty cents per box. The box costs fifteen cents. It is difficult to ascertain what the yield is as there is only a small acreage planted, but both fruits bear fairly heavy and produce about one-half box to the tree.

Future of Crop

Neither quinces nor pomegranates will be produced largely here as the market is limited, but there is suffiicent demonstration that the fruits grow and will bear well here.

SUNFLOWER SEED

Authority: E. Powers, Manteca; J. L. Dempsey, Manteca.

Sections

Sunflowers are grown in the southeastern part of the county, mostly about the town of Manteca, and in small quantities in the Lodi section.

Soil

A sandy loam soil is suitable to sunflowers. It should have some depth and be free from alkalai.

Climate

The temperature should be very warm in the summer. Frosts are detrimental.

Planting

The land should be plowed deep in January and again, though not so deep, in March. The cost of preparing land is about three dollars per acre. The planting should be done the first of April. The common method is to seed with a drill in rows forty inches apart and every fourteen inches in the row. Three seeds are dropped to the hill. The seed costs twenty-five cents per acre and the planting costs fifty cents per acre.

Cultivation

As soon as the plants have sprouted they should be cultivated with a hoe and thinned, leaving only one plant to the hill. The cost of hoeing is $1.50 per acre. The field is cultivated three times each way during the season. The cost of these cultivations is three dollars per acre.

Irrigation

Irrigation has thus far not been practiced but the moisture is held by frequent cultivations. The yield would probably be increased by irrigation.

Cost of Planting Sunflowers

Preparing land	$ 3.00
Seed, 5 lbs. per acre, at 5c. lb	.25
Planting seed	.50
Hoeing	1.50
Cultivating	3.00
	$ 8.25

Harvesting

The sunflower seed is ready for harvest in September. The head of the sunflower hangs on the top of the stalk by a crooked stiff stem and the practice is to strike the blossoms from the stalk with a large knife and throw them into a pile. Six rows are thrown together. The harvesting should take place before the seed becomes too ripe and falls from the blossom. The picking costs $2.50 per acre and the hauling fifty cents per acre. The thrashing costs ten cents per sack.

Cost of Harvesting

Picking	$ 2.50
Hauling	.50
Thrashing, 10c. per sack, 20 sacks per acre	2.00
Sacks, 10c. per sack, 20 sacks to acre	2.00
	7.00
Total cost of production	$15.25

Yield

The yield will average twenty sacks to the acre of seventy pounds each. The selling price is from two and a half cents to four cents per pound, with an average price of three cents.

Profits

The grower should receive about forty dollars per acre from sunflowers. The cost of production is $15.25 per acre, not counting the rental of land, which would be from five to ten dollars per acre additional. The profits will therefore be from twenty to twenty-five dollars per acre.

Market

The seed is sold to manufacturers of chicken feed. It is comparatively easy to flood the market with this crop and the grower sometimes has to hold the seed for a satisfactory market.

TOMATOES

Authority: F. M. Cowell, Manteca.

Sections

The growing of tomatoes in large quantities for canning is confined to the immediate vicinity of Manteca. Tomatoes for table use are produced in all parts of the county, but chiefly by the Italian gardeners near Stockton and along the several strips of river bottom land that cross the county.

Soil

Loose sandy loam is suited to tomatoes.

Climate

The climate should be warm during the growing season and entirely free from frost, as the plant is very susceptible to frost damage.

Land Values

Land suitable for tomatoes in the South San Joaquin Irrigation District is selling at the present time for $150 per acre. Near Stockton and along the river bottom unimproved land cannot be bought for less than $200 per acre.

Variety

The variety generally grown is the red rock or stone tomato.

Irrigation

Irrigation is not practiced, the moisture being kept in the ground by means of cultivation. If, however, the soil is dry, it is a good practice to irrigate while the plant is young. If water is applied after the plant begins to bear the quality of the fruit is not so good.

Planting

The seed is sown in hotbeds from January 20 to February 10. The hotbed should be covered over with a strip of house-lining to protect the young plants from frosts and birds. About two ounces of seed should be sown for every acre to be planted. The cost of seed is twenty-five cents per ounce, or fifty cents per acre.

The young plants are set out after the danger of frost is past, about the first of April. The land should be plowed deeply first in January and again to a less depth in March. The cost of two plowings will be three dollars per acre. Then the land should be marked off by dragging a two-by-six on runners over it. The runners are set six feet apart as the plants are to be set six by six. This marking will cost fifty cents per acre. Then the plants are set out one to each hill. The cost of planting is about $1.50 per acre. There are 1,210 plants to the acre.

Cultivation

The field is hoed twice, at a cost of one dollar per acre each time, or two dollars per acre for the season. Cultivation with a horse cultivator is kept up through the season, going over the land about four times, at a cost of two dollars per acre for the year.

Harvesting

Harvesting begins the last of July and continues until cold weather and frosts kill the vines, usually the latter part of September. The vines are gone over every week. The ripe tomatoes are picked off and put into lug boxes in which they are shipped to the cannery. It is essential that labor enough be employed so that none of the tomatoes need be held more than two days after picking.

Forty acres in tomatoes will keep twelve men busy during the harvesting season to load a car each day. Labor usually costs five cents per box, or two dollars per day. The cost of harvesting is two dollars per ton for picking and fifty cents per ton for hauling—a total of $2.50 per ton.

Yield

The yield depends largely on the season. Irrigation is often not practiced. The average is from twelve to twenty tons per acre. The price received for tomatoes is $7.50 to $8 per ton, nearest station.

Profit

The income based on a yield of twelve tons to the acre at $7.50 per ton would be ninety dollars per acre. The authority for this paper had four acres of tomatoes in 1913 and the income amounted to exactly ninety dollars per acre. The profit figured on this basis would be $90 less $39.50, or $50.50 per acre.

Markets

The cannery to which most of this fruit is shipped is located in San Leandro, Alameda County. A cannery at Manteca is now in operation, and this will effect a saving in freight for the farmer.

Cost of Production

Seed	$ 0.50	
Plowing	3.00	
Marking	.50	
Planting	1.50	
Hoeing	2.00	
Cultivating	2.00	
Harvesting	30.00	(Based on 12 tons to the acre.)
Total cost, not counting irrigation	$39.50	

Labor

The labor question is sometimes a serious one, because the crop is perishable and must be handled expeditiously.

WALNUTS

Authority: W. W. Fitzgerald, Stockton.

Sections

Walnuts are quite generally grown throughout San Joaquin County. The largest plantings are located to the north and east of Stockton and to the south as far as French Camp. The islands to the west of Stockton are not so well adapted to walnuts except in the higher and better drained sections. Walnuts do not do so well in the southeastern part of the county where the soil is light.

Soils

Heavy, well-drained and deep soils are best adapted to walnuts. In selecting a location nothing is more important than the soil. It is useless to plant walnuts on light sandy soil, for the tree will be short-lived and will never produce well, although it may attain a good growth at first. The same applies to soils underlaid with a gravelly or sandy subsoil. The soil must be well drained, for the tree will not stand dampness about the roots. The soil must also have plenty of depth. Alkali land is not suitable for walnuts.

Climate

Climate is not so important a consideration in the growing of walnuts as is the soil. They do best in a moderate climate with neither extreme heat nor extreme cold, but will stand great cold in the winter when the tree is

dormant. Extreme heat in the summer will darken the meat of the nut. Spring frosts may catch buds just coming out and so shorten the crop. Early frosts in the fall before the tree becomes dormant may damage the tree. Foggy weather makes the tree susceptible to disease, but a great many of the groves of the south are growing successfully in sections subject to fogs. Care should be used in selecting the variety suited to each particular section.

Varieties

The walnuts best suited to this section are the later budding varieties, which are not so apt to be caught by late spring frosts. There are the Eureka, Franquette, Mayette and Concord. The Placentia and Prolific, earlier varieties, are often used for interplanting, as they will bear earlier and more abundantly than the later varieties.

Walnuts have not been grown thus far very largely on a commercial scale in the northern part of California, so that the variety best suited to northern conditions has not been determined. The Eureka and the Franquette both blossom late, both are resistant to blight to a certain extent and both produce excellent nuts. It is claimed that the Eureka produces more abundantly than the Franquette, which is known to be a shy bearer. These varieties are, at the present time, the most popular in the county, although some earlier varieties, which have not been tried out so extensively, may yet prove to be the most profitable.

Propagation

The root stock on which the variety desired has been budded or grafted is of vital importance. One should not plant seedling trees, for the growth and production of such an orchard will be uncertain. It may prove excellent but the chances are against success and there is sure to be a lack of uniformity. The best results are to be had by using the black walnut or the hybrid walnut root. These are hardier and will stand less favorable soil conditions. The hybrid walnut root will produce a more thrifty and vigorous growth and will bring the tree into bearing quicker than other roots.

Setting Out an Orchard

Before planting the land should be put into first-class condition. It should be leveled, ditched and the drainage cared for. The trees should be set out about March, when the ground is warm. If heavy land is to be used it is a good practice to blast the holes where the trees are to be set, and this is a safe practice in any soil. Blasting should be done in the Fall before the rains, so as to prevent the plastering of the soil in the bottom of the hole. If done in the Fall before the soil is wet time should be allowed for the soil to dry out and crumble in the hole.

It is a common practice to interplant walnut trees with other crops, such as peaches, berries and alfalfa. This may be done either before or after the walnuts are planted. Where alfalfa is planted the irrigation for that crop insures plenty of moisture for the walnuts and is very satisfactory if drainage is provided.

The small trees received from the nursery should have at least eighteen to twenty inches of root and the top should be cut back to about two feet. The cut trunk should be waxed. This is sometimes done by the nursery before sending out the tree.

The trees are set usually about forty or fifty feet apart, more fifty by fifty than otherwise. This makes seventeen trees to the acre. The trees usually sell for from one dollar for seedlings to two dollars for trees grafted on hybrid roots. It is the practice to stake the small trees. This does not have to be done immediately but as soon as the trees are growing well they should be tied up to insure straight growth.

Cost of Planting an Orchard

The cost of starting an orchard varies widely, according to the conditions prevailing on the particular piece of land. These figures have been taken from the experience of several growers in San Joaquin County. Thus far it has been the common practice to interplant with alfalfa in order to get some quick returns.

Leveling and checking, per acre	$25.00
Blasting 17 holes at 25c. each	4.25
Headgates, average one to the acre at $1.75	1.75
Trees 17 to the acre, at $2 each	34.00
17 stakes and driving, at 15c. each	2.55
Planting the trees at 15c. each	2.55
Alfalfa seed, 25 lbs. at 20c	5.00
Incidental expenses of hauling, etc	5.00
	$80.10

In this table labor is allowed for at the rate of two dollars per day.

Cultivation

Walnuts require less cultivation than do most of the fruit crops. They do nearly as well without cultivation as when the soil is plowed and cultivated each year. For this reason alfalfa provides a particularly suitable auxiliary crop. It is, however, a good practice to leave a four-foot square of land which may be cultivated around each tree. This means a little hand cultivation but this can be done in connection with tying up the tree and the individual care that the tree demands at first. If alfalfa is not sowed between the trees the orchard is plowed and cultivated much as are other orchards.

Irrigation

The walnut will stand a great deal of drought but does much better with occasional irrigation. Plenty of soil moisture is one of the secrets of success. If the soil is light the practice of irrigating just before the walnut hull bursts open prevents the hulls from sticking to the nuts. On heavy land the trees do not have to be irrigated as often as on light soil. If alfalfa is raised between the trees this should be irrigated every five or six weeks. With a large head of water one hundred acres of adobe land can be irrigated in forty-eight hours. The labor is paid about $2.50 per day and one man must be on the job all the time. The cost of water is from $3 to $3.50 per day.

Drainage

Drainage is necessary on adobe land and is usually arranged for by running a ditch about four feet deep across the lower end of the land. This method is difficult if the country is level and there is no outlet for the water. However in this county the fall is ample and no difficulty is encountered.

Land Values

Land suitable for walnuts sells at from $100 to $300 per acre, with an average of $200 per acre. The price depends upon the soil, proximity of land to town, good roads and transportation facilities.

Diseases

The walnut is subject to diseases like walnut blight and oak root fungus. Some varieties are more subject to disease than others and one should exercise care in the selection of varieties that are resistant. Blight is most common in foggy damp climates. Fungus growth is only found on land which has been cleared of oak trees. It does not attack trees grown on a hybrid on black walnut root. The blight may be further avoided by selecting blight-resistant varieties.

The Alfalfa Field

It is sometimes difficult to start a stand of alfalfa on this heavy adobe soil because the soil remains chilled, but this can be accomplished if care is taken at the time of seeding. On the heavy lands where water is available for irrigation it is probably better to seed in the fall before the ground gets cold. Once started in adobe soil alfalfa produces well and is long-lived, providing there is drainage. The seed should not be put too deep into adobe soil as this alfalfa is surface germinating and needs the surface warmth. The first year the total yield is about five tons of hay to the acre, and after that eight tons to the acre. The size of the crops vary, but the above is an average. The hay sells for from eight to ten dollars per ton.

The Walnut Yield

Walnut trees will not begin to bear until the fourth year at the earliest. Then they will produce a few nuts, about five pounds to the tree on the more prolific bearers. The yield continues to increase until in the eighth to tenth year, when the grove ought to be bearing about 1,000 pounds of nuts to the acre. Much greater yields are expected from the hybrids which are being set out so extensively at present. One small orchard in the southern part of San Joaquin County averaged, over a period of ten years, 1,200 pounds to the acre, and the average price during that time was thirteen and a half cents per pound.

Harvesting

The nuts are harvested in September and October. They are allowed to fall on the ground and are then picked up, sacked, bleached and resacked, the whole operation costing about one cent and a half per pound.

Selling Price

There are three grades of nuts, the select nuts bringing the highest prices. This year (1914) the price for the first grade is nineteen cents per pound, which is high, but the California Walnut Growers Association paid twenty-five cents a pound for San Joaquin County Franquette, Eureka and Mayette nuts. The average price for number one nuts over a period of ten years was thirteen and a half cents per pound. The selling price fluctuates with the market.

Life of Walnut Trees

The walnut is very long-lived. Trees are said to bear at 150 years.

Future of Industry

Walnut culture in this county is starting out on a good basis, after thorough investigation on the part of the growers. The outlook for this crop in this section of the State is bright and it is expected to be one of the foremost industries of the county.

BEEF PRODUCTION

Scope of Industry

While beef cattle are raised in small numbers throughout San Joaquin County there are not enough raised here to supply the home market. Much of the beef consumed in the county is shipped in from Nevada and the northern counties.

Most of the land is too valuable for grazing, but there are a few sections suitable to this purpose. The foothill lands along the eastern edge of the county and in the extreme southwestern corner are devoted almost exclusively

to grazing. The grazing on these hills in some years is fairly good until the first of May. In a dry year it does not amount to much. About the first of May the cattle are taken back to the mountains and kept there until the first of October.

Sections

There are several ranches in the bottom-lands of the San Joaquin, from Lockeford to Clements, where cattle-raising is still actively engaged in. The Mokelumne River bottom lands around Lockeford and Clements and the bottom lands of the San Joaquin River from San Joaquin City north to Lathrop, produce a great deal of salt grass and wild pasture which makes excellent feed. These two sections together with the hill land are largely devoted to cattle raising.

BEES

Authority: C. T. Wiggins, Lathrop, 1914.

Sections

Because of the fact that this has for years been a grain country and few blossoming plants have been grown, little attention has been given to bees except along the river bottoms where they obtain honey from wild flowers and tree blossoms. There are a number of hives along the several rivers but no one has gone into the business extensively as yet. One farmer has a number of hives along the San Joaquin River bottom near Lathrop.

Varieties of Honey

The honey, which is dark colored, is extracted from the comb and sold in five-gallon cans.

Price of Bees

A swarm of good bees in a good hive costs five dollars, but poorer hives can be bought for as low as $1.50.

Future of Industry

Alfalfa, which is now being planted so extensively, is an excellent source of honey and it is probable that many more hives will be kept. The business of producing honey commercially will undoubtedly grow.

Remarks

Bees can be kept easily as a side issue on any ranch. The honey helps to make up the living expenses of the family and is one of the good things available without much effort on the ranch.

DAIRYING

Authority: N. H. Locke, Lockeford; J. E. Thorp, French Camp; G. A. Stowe, Lathrop.

Scope of Industry

No particular section of San Joaquin County can be said to be chiefly a dairy section. There are large and small dairies scattered all over the county. Since alfalfa can be grown in almost all parts of the county so almost all parts of the county are adapted to dairying.

There are nine large dairies on Roberts Island, several near Thornton in the New Hope section, several along the San Joaquin River bottoms out from Banta and Stockton, and some in the immediate vicinity of Stockton.

In the vicinity of Lodi it is quite usual to find the small farmer milking two or three cows and selling the butter fat to the wagons that come to his

door every day to collect. In the South San Joaquin Irrigation District there are quite a number of dairies milking twenty cows. This section is primarily adapted to alfalfa and there is no doubt but what dairying will be one of the foremost if not the leading industry of the section.

Cost of Starting a Dairy

Twenty-five cows require at least twenty-five acres of land. Of this fifteen acres should be put into alfalfa, five acres used to produce corn ensilage and the other five acres given up to house, barns, corral, hog-pens, etc. The land would probably cost $200 per acre, or $5,000 for twenty-five acres. A barn suitable for the cows and large enough to hold the hay would cost at least $500. Other necessary equipment for the dairy would cost another $250, and if a silo is to be built, the cost will be another $300 if made of wood or $500 if made of concrete. The twenty-five cows will cost $2,000; the bull $250; there will be other costs for hogs, horses for working the ranch and the necessary implements. To get fully started on such a ranch and to pay for everything would cost about $10,000.

The land can generally be purchased on easy terms, and much of the building of barns and corrals can be done by the dairyman himself. His cows and hogs can also be bought as opportunities arise and thus the dairyman can gradually work into the business, building up his dairy as he becomes fitted to it.

Only the man with money can afford to go into a strange county and start a complete dairy immediately.

Feeding

Dairy cattle are fed chiefly cured alfalfa hay, and alfalfa pasture. In some instances grain, or ensilage, or by-products of different kinds are fed in conjunction with hay and good results are obtained by the practice, but the average farmer depends on the hay and what pasture is available. It is figured that a cow will consume about one-half ton of feed per month, or six tons per year, where there is pasture.

If no pasture is available some sort of succulent feed should be supplied in order to keep the cow in good condition as well as to increase the milk flow. Melons and pumpkins are good.

Probably the best substitute for pasturage is ensilage. The corn is harvested just after it goes out of the milk, then chopped and stored in the silo. About thirty-five pounds per day is fed to the cow, or about one-half ton per month. The cost of ensilage, including labor and interest on the land and silo is about $1.75 per ton. It may or may not be fed throughout the year. The cost of alfalfa hay has been from eight to ten dollars per ton for the last few years. Most of the dairies raise their own hay on the ranches.

Breeds

Holstein, Jersey and mixed breeds are milked in the county. There seems to be no favoritism for one or the other breeds in this section. Most of the dairies have grade or mixed cows. There are, however, pure bred herds of both Holstein and Jersey.

Cost of Cows

Cows may be purchased at from $60 to $100 each. Probably an average price would be $75. Good cows, however, are rather scarce and it is frequently difficult to get good stock without having them shipped in. Pure bred bulls can be bought as calves for $75 to $125 and grown bulls for from $150 to $250 each, the price depending upon the age and pedigree of the animal.

Labor

Labor offers the big disadvantage in dairying. The work is very confining, as the cows must be milked night and morning. Portuguese and Swiss milkers are considered the best. They are usually paid about forty-five dollars and board, which may be counted another fifteen dollars at least; it is generally figured that the milkers cost sixty dollars per month. One man will milk a string of thirty cows, feed them and keep the barn clean, separate the milk and feed the skim milk to the hogs.

Milking Machines

Milking machines are being used in several dairies in the county and apparently give satisfaction and lessen the labor. The chief difficulty in connection with these machines is that the rubber tubes through which the milk runs are not always properly cleaned, especially if one has to depend upon hired help. A plant for milking sixty cows, including motor, pump, piping and buckets, costs six hundred dollars. The electricity required to milk the sixty cows costs about seven dollars per month. Two men with four units can milk sixty head of cows in one hour and forty minutes. One man tends to the units and the other follows and strips the cows.

Rental of Land

Many dairymen rent dairy ranches. Land in alfalfa rents for twenty dollars per acre per year.

Dairy Inspector

A State Dairy Inspector visits all the dairies through the county about once a month and compels the dairymen to live up to certain rules of cleanliness and sanitation.

Age of Cow

A young heifer comes into milking at two years old and will be profitable until twelve years old. The cow is milked for about ten and a half months in the year.

Diseases

Cows are affected with several diseases, among which is alfalfa bloat. While this does not occur often, yet once in a while a cow is lost.

Shelter

Shelter for cows is not absolutely necessary, but the common practice is to milk the cows in the barn and leave them there at night during the winter time. A barn with a concrete floor is much easier to keep clean.

Cost of Production

The cost of production, taking as a basis for figures a dairy of twenty-five cows, which will just about keep one man busy, the equipment of barn, corral and separator will cost about $750. The cows, twenty-five at $100 each, will cost $2,500. The interest on this investment must be included in the costs of production.

Hay, 150 tons at $4 per ton	$ 600.00
Ensilage (other feed could be used at same cost), 75 tons at $4 per ton	131.25
Labor, one man at $60 per month	720.00
Interest on $750 equipment at 7%	52.50
Interest on $2500 for cows at 6%	150.00
	$1,653.25

For one cow the cost would be $22.50 per year. It will be noticed that the profits as indicated by these figures is only $46.53 per year per cow. We

have not taken into consideration pasturage which might be available and thus the cost of production might be lessened. Furthermore, feed has been figured for the cow for twelve months while as a general practice the cows are turned out for about six weeks of the year. This would probably cut down the cost a little more, although the interest or rent on such pasturage land would have to be figured.

Marketing

Marketing dairy products here is a very simple matter because of the transportation facilities, the proximity to the large cities about San Francisco Bay, and the fact that the extent of the industry in the San Joaquin Valley makes competition among the buyers very keen. Those who buy the butter-fat usually have wagons going through the country, as the creameries collect the cream from the ranches.

There are three creameries in Stockton, one in Manteca, several in Sacramento, Modesto and San Francisco, which send their agents into the county to get cream. Many of the dairies, particularly those on Roberts Island, and those close to water transportation, ship milk to San Francisco and Oakland.

Price

The price received for butter-fat is based on the San Francisco market quotations. The wagons which collect the cream pay from three to four cents above the quotation. The price averages thirty-one cents per pound for butter-fat during the year. Milk brings fifteen and sixteen cents per gallon.

Amount of Production

Production per cow depends entirely upon the cow and the care she receives. Some cows do not pay for their board while others pay exceptionally well. In selecting cows it is best to get only good animals, even if it is necessary to pay a premium over the prevailing price. It may be safe to say that the average yield of milk per cow throughout the county is about two and a half gallons of four per cent. milk a day. As a gallon of milk weighs eight pounds, this means that 288 pounds of butter-fat in a year, and, at an average price of thirty-one cents per pound, this would be $89.28 per cow for the year. This is about the average, although many cows do better and some not so well. Besides this the average cow will produce about 6,900 pounds of skim milk in the year, which will feed the hogs and calves and is worth twenty-five cents per hundred pounds. This brings the total revenue up to about $106.53, besides value of the calf and manure. The calves are sold to the butcher at two months; they bring about ten dollars cash. At two months of age the calf has consumed about one thousand pounds of skim milk, which has a value of $2.50, so that $7.50 from the calf can be accredited to the cow. The manure, which is so often wastefully discarded, is valued by the better ranches at about five dollars per year per cow. On a rented ranch this last item can hardly be counted.

Income

It must always be realized that there is a great difference in cows and that the two-and-a-half-gallon cow has been taken as a basis for figures. The income, then, is about as follows:

Butter-fat for one year	$89.28
Skim milk for one year	17.25
Calf sold at two months for $10	7.50
Manure, roughly estimated	5.00
Total production	$119.03

Advantages

The chief advantage of the dairy business is that it brings in a regular monthly income. A few cows can be cared for and the work considered a part of the daily chores in connection with any other kind of ranching. Then, too, one may start on a small scale and so build up a business that will indeed be a reward for industry. On the sandy lands, the value of manure is a great item. A few cows often enable a man to carry his ranch over until a fruit orchard or vineyard becomes profitable.

The Silo

By the use of ensilage the dairyman furnishes to the cow the equivalent of green feed all the year around. Through the summer and fall the green feed of mixed pasture dries up, and it does not pay to pasture alfalfa when the range is close, for it is not as nourishing as when allowed to grow a little longer. Alfalfa hay fed alone is a one-sided ration. To help out in the period of no pasture and at the same time to balance up the hay ration and thus keep the cow in good condition the practice of storing and feeding ensilage is a good one.

The Cost of the Silo

The cost of the silo depends on the size and the material used. A silo built near French Camp in this county cost three hundred dollars. It is made of wooden staves bound together by steel bands and is sixteen by thirty-two feet with a five-foot cement basement. The capacity is about 160 tons. A concrete silo will cost a little more than five hundred dollars. Concrete construction is considered better in a warm climate because the wooden silos are apt to shrink in the sun when empty.

Filling the Silo

There are numerous field crops that make good ensilage, but the best is probably corn and since corn can readily be raised for this purpose in San Joaquin County we will consider that crop.

Corn is planted from the first of April up until July. About eight quarts or fourteen pounds of seed are sown to the acre, in rows three and a half feet apart, ten inches apart in the rows. The seed costs about $1.25 for fifty-six pounds. A two-row planter will sow twelve acres per day. By hand a man can sow two and a half acres a day. When the planter is used the planting costs thirty-five cents per acre. The corn must be irrigated about three times in a season. The water will cost about three dollars per acre, besides the labor of applying, which will be another $1.50, or a total of $4.50 per acre per season. Cultivation (about four times) will cost two dollars per acre. The corn is cut just after it goes out of the milk. The usual practice is to cut for a half day and haul the corn to the silo in the afternoon. As the corn is hauled it is put through the chopping machine and blown into the silo with a blower. Two men remain in the silo and tramp the silage down. One man at the chopper, three hauling and four in the field loading makes a convenient working crew. The cost of harvesting is about three dollars per acre. The yield of corn averages eighteen and a half tons per acre. Figuring interest on the money invested the cost of growing and filling the silo, the total cost is about $1.75 per ton.

Feeding

Ensilage feeding usually begins as soon as other green feed is unobtainable. About one foot a day is taken from the top of the silo at first to prevent spoiling, but down where it is packed removing an inch and a half a day is sufficient to keep it from fermenting. The usual feed is about thirty to forty pounds of ensilage to the cow each day.

SWINE RAISING

Authority: A. M. Henry, President California Swine Breeders Association, Farmington, California.

A Promising Industry

San Joaquin County is peculiarly adapted to the raising of swine. With its varied crops and equable climate it is not difficult to find just the place to produce the kind of crops desired.

The man who has an alfalfa ranch may perhaps produce pork more cheaply. Alfalfa alone will not produce pork but the hog will live easily on alfalfa and the right amount of grain, skim milk, or such feed as the owner may be able to obtain cheapest added to the alfalfa makes the balanced ration which is absolutely necessary to the proper development of the hog. Alfalfa is produced in the several districts in San Joaquin County in great quantities.

In some parts of San Joaquin County natural grasses produced on small acreages during the growing season are just as good as alfalfa for hog feed.

For profit in pork, hogs should be brought to a weight of 150 to 200 pounds as quickly as possible. In raising hogs for breeding purposes the object is to raise them in such a way as to develop the growing pigs into perfectly built animals that will make prolific breeders of hardy healthy stock.

A grain ranch, with some alfalfa on a creek bottom for summer grazing at the time the hogs are running on the stubble field, and pasture for winter range when the hogs are being grain-fed, makes a proper combination for successful swine raising. This applies equally to raising hogs for market and for breeding.

Grains form the carbonaceous or fat-producing foods while alfalfa forms the nitrogenous food that produces muscle, hair, hoofs, bone, etc. Since San Joaquin County produces plentiful crops of grain and offers the best of pasturage the opportunities for hog raising are excellent.

Skim milk is one of the best of hog feeds. Dairying is an important industry in San Joaquin County. The man who milks cows on an alfalfa ranch and raises hogs, feeding them the skim milk, has the opportunity to get more profit out of his skim milk than he could in any other way. Skim milk, in conjunction with other foods, has a value as a balancer which makes it profitable when fed pure bred hogs, and with the present high prices for such hogs prevailing skim milk will bring about as much money as butter-fat.

The question uppermost in the mind of one contemplating raising swine is, "What are the actual financial possibilities of the hog business?" The swine raiser generally expects his sows to raise an average of seven pigs to a litter and two litters each year. At the end of the year he should have seven one-year-old pigs and seven six-month-old pigs. If only fairly well raised the yearlings should weigh three hundred pounds each and the six-month-old pigs 150 pounds each. This makes a total weight of 3,150 pounds. For several years the market price of pork hogs on foot has hovered around eight cents per pound. Three thousand one hundred and fifty pounds at eight cents would amount to $252, the gross income from one sow.

What has been the cost of producing this pork? This depends upon the method of feeding, whether the pigs have been fed most of the ration or whether they have grazed for part of it. The careless feeder expects any sort of grain fed any way to produce one pound of pork for each five pounds of feed, while the careful feeder makes five pounds of feed produce at least two pounds of pork.

Five pounds of feed at one and one-half cents per pound or seven and one-half cents should produce two pounds of pork, thus making the produc-

tion cost of one pound of pork three and three-fourths cents, the value of this one pound of pork being eight cents.

If one-fourth of each pound of the pork was produced by pasturing the profits would be increased, but figuring production costs in the most expensive way, the profit on a pound of pork would be four and one-half cents. On 3,150 pounds the profits would be $133.87½. This amount would be partially exhausted in paying the feeder, maintaining the dam and sire, and other fixed expenses, but in no case would these additional expenses exceed $33.87½, leaving an actual gross profit of $100 on each sow.

Any careful producer will declare these statements very conservative. Looking at the proposition from the standpoint of the experienced breeder who knows San Joaquin County and its possibilities and who can see great possibilities for future swine raising, it may be truly said that for an agreeable, profitable business entailing no great labor swine raising in San Joaquin County is indeed promising.

HORSES

Extent of Industry

Horses are not raised on an extensive scale in San Joaquin County, although every farm naturally has its own stock. There are no large bands as sometimes found in mountain ranges. There are a number of fine stallions stationed in various parts of the county and most of the small farmers have a mare or two which they breed each year. The colts, in a couple of years, are worth from $100 to $150 each. There are one or two men in the county actively engaged in the business of producing horses.

Sections

One ranch near Tracy imports and raises very fine horses of the heavy breeds. One firm at Stockton makes a business of importing and distributing fine jacks and jennies.

Markets

The industry, while not a large one in the county, has resulted in the production of many fine horses. Good animals are easily disposed of in the city markets around San Francisco Bay.

POULTRY

Authority: Max Hempel, Manteca.

Sections

The southeastern corner of the county where the soil is sandy, the section immediately adjacent to Lodi and the section along the edge of the foothills where the soil is shallow and gravelly, are suited to poultry raising. A large part of this county, where the soil is heavy and poorly drained, is not suitable for poultry production.

Soil

A sandy, well drained soil rather than a rich soil is essential.

Size of Poultry Farm

Poultry production does not require a large piece of land. Five acres is enough to support two thousand hens. A little more land should be purchased as about one and a half acres will be required for the house and barn. Two acres are sufficient for chicken yards and the remainder of the ground should be planted to green feed.

Cost of Land

The cost of land depends upon the location. In the southeastern corner of the county prices average at present about $150 per acre. About Lodi land is selling for from $200 to $300 per acre. Along the foothills the land sells for from $50 to $75 per acre.

The equipment necessary for starting a poultry farm depends upon how extensively one wishes to go into the business. Unless familiar with the business it is well to proceed cautiously. The expenses of incubators and incubator houses and of hatching the chicks may be avoided by buying what are commonly called "day-old-chicks." These cost about ten cents each. One brooder house sixteen by thirty-two feet may be divided in the center, one side for exercise and the other for warmth and sleeping quarters. A house of this sort will cost one hundred dollars and will provide room for 1200 chicks. A roosting house should be built sixteen by one hundred feet. This will cost about two hundred dollars. Fencing will cost one hundred dollars.

Cost of Chicks

Twelve hundred chicks at ten cents each will cost $120, and one has to figure on a loss of from ten to twenty-five per cent., the stock running about half pullets and half cockerels.

Cost of Production

The sale of broilers at ten weeks of age should pay the total costs of all the chicks up to that time. The sale of hens when two years old should pay the costs of carrying the pullets from ten weeks old until six months old, when they begin to lay. The cost of keeping the hen during the egg production period is taken from the receipts from the sale of eggs. It costs about $1.25 per year to feed one hen.

Returns

It is difficult to estimate returns because they depend entirely on care and management. At ten weeks of age broilers should weigh, for light breeds, about one and one-quarter pounds, and among the heavy breeds two and a half pounds. The price received for these depends on the time of marketing. In the early spring, about March and April, the broilers sell for eighteen to twenty cents per pound. A little later, in May and June, the price drops to sixteen and seventeen cents per pound. Through the fall and winter the price is twenty cents per pound. Old hens sell for fifteen cents per pound, among the light breeds and about seventeen cents per pound for the heavier breeds. Leghorns weigh about three pounds and the heavy breeds about six pounds. The eggs sell at an average price of twenty-five cents per dozen and a thousand hens will average one hundred eggs each in a year. In many instances the yield is greater. It is commonly figured that each hen should clear one dollar per year.

Remarks

The poultry industry has not received the attention here that it should have had. Poultry books and journals have gone into the details of poultry production very extensively and the figures quoted have been only roughly drawn. The profits depend entirely upon the attention to detail and upon the care given the hens.

The excellent transportation and market facilities found in this county make this a good section for egg production. Furthermore, this is a great grain center. Kaffir corn can readily be grown on the sandy lands in the southeastern corner of the county. The cost of feeds can frequently be cut

down by buying at times of the year when grain is being harvested and selling at a low price. It is probable that poultry production will receive increased attention.

SHEEP RAISING

Authority: Louis Wagner, Stockton, 1914.

Extent of Industry

Many thousands of head of sheep are raised in San Joaquin County, although no large bands are found such as are raised in the northern part of the State. Most of the sheep raised here are owned and herded by Basques and Portuguese who keep them moving from one feeding ground to another, buying the feed or renting the land on which the sheep graze as they go. Very few sheepmen own their own land. One or two along the foothills in the vicinity of Clements own their land and keep the sheep along the foothills during the lambing season. They graze their sheep along the foothills and river bottoms during the winter and through the lambing time and then take them to the mountains about the first of June, where they are grazed for a few weeks and then brought back in the latter part of July to run on the stubble fields and island lands through the later summer and fall.

Many sheep are also taken to the hills to the west, where they are wintered and kept during the lambing season, after which they are taken to the salt marshes or any place where they can find feed until they can get back onto the stubble fields and islands. After harvest time sheep are brought in from all directions.

Feed

Stubble fields probably form the largest source of feed, the sheep picking up the scattered grain and fattening rapidly. The potato lands on the islands produce a great many potatoes which are left ungathered by the diggers and which the sheep readily root out of the ground. The bean land furnishes what is considered ideal sheep pasture. The straw left after the thrashing is excellent for winter if dry. It is fed the last thing before the rain comes. It is also a common practice among the grape growers to let the sheep clean up the vineyards. The sheep eat the leaves that have fallen to the ground and with the leaves go mites that infest the vineyard.

Cost of Feed

The price sheepmen pay for feed depends on the amount and kind furnished. On the islands it runs from seventy-five cents to one dollar per acre for the season. The sheepmen simply offer vineyardists so much for the privilege of turning the sheep in to clean up the land.

Lambing

The lambing season begins the latter part of January and lasts to the first of February. The percentage of increase runs from eighty-five to one hundred per cent.

Shearing

The sheep are sheared twice each year, first in March and a second time in August. The latter clip is very short and only brings about two-thirds as much as the March clip. The March clip weighs about four and a half pounds and the August clip three and a half pounds.

The Breed

Shropshire rams and Merino ewes are favored breeds in starting the flock, and the majority of the sheep are thus cross-breeds.

Diseases

Foot-rot sometimes bothers the sheep on adobe lands. The State Inspector takes great precautions to keep this disease from spreading, and constantly urges regular dipping as a preventative and to kill scabs that may have gotten among the sheep.

Marketing

Sheepraisers usually make contracts for the sale of the lambs in February for March or April delivery. When two months old the lambs sell for from $2 to $2.25 per head. The wool varies somewhat in price but averages from fifteen to twenty cents per pound for the March clip and from nine to ten cents for the August clip.

Remarks

The sheep business will always be an important industry of San Joaquin County.

There is practically no goat range in the county, only about 250 goats being raised here.

MANUFACTURING

Location

Manufacturing in San Joaquin County centers largely about the City of Stockton.

Stockton is excellently situated for factories of almost any kind, and particularly so for such factories as use raw materials from the farm or whose products are for use on the farm. In other parts of the county there are scattering establishments manufacturing various sorts of products.

Transportation

Stockton, the manufacturing center, is located at the point where railroads and water transportation come together, four transcontinental railroads competing for the business. The fact that the whole county has excellent transportation facilities and is situated in the center of the State makes it apparent that this county will continue to be a manufacturing center.

Products

Stockton has become a very large producer of agricultural implements. The Holt Manufacturing Company manufactures traction engines, harvesters, plows, scrapers, harrows and a variety of farming implements. There are other factories here which make combined harvesters, gas engines, farm implements, tractors and irrigating plants. One concern makes only clam-shell dredges, another devotes its energies to shipbuilding, and another to sheet metal and iron construction. Large flour mills and cereal food manufactories are located here.

Products of Stockton Center

A glass factory, large tannery, and wool-scouring plant are also large employers of labor. There are brick-yards, planing mills, three creameries, a winery, a fruit cannery and a bean cannery, and many smaller factories located in Stockton.

Products of Other Centers

In Lodi is a large basket factory, several producers of irrigation pipe, a fruit-juice factory, canneries, wineries, and fruit-packing houses, at Woodbridge a grape-tartar factory and near French Camp is a factory which operates at intervals and grinds and roasts chicory for the market. Near

Ripon is a small factory which pickles olives and cans tomatoes in small quantities. There are numerous wineries in the county and the making of wine is one of the chief industries.

Openings for Labor

Because of the fact that the county is well supplied with transportation and is centrally located near the large cities of the State labor is usually available.

Wages Paid

The average wage paid is two dollars per day, although during harvesting season the wage for certain kinds of labor is somewhat in advance of that.

TAXES

Rate

The tax rate throughout the county is $1.85, plus the school tax, which differs in the various districts. This is entirely separate from city taxes. The county is bonded for $1,800,000, bearing five per cent. interest, a debt contracted to build the excellent roads of the county. These are forty-year bonds.

SCHOOLS

Authority: California Biennial School Report, 1911-1912. County Superintendent, J. W. Anderson, Stockton.

Teachers Employed

Elementary Schools—Twenty-four men, 187 women.
High Schools—Fourteen men, eighteen women.

Enrollment

Elementary—7,542 (eighty-eight school districts).
High Schools—737 (two high schools).

Number of Schools

San Joaquin County, being comparatively well settled, has excellent school advantages. There are eighty-nine schools in the county at the present time. These are well scattered over the county so that any child can find educational facilities within easy reach of home.

High Schools

Union High Schools are located in Lodi, Tracy, Ripon and Galt, and one of the best high schools in the State is located in Stockton. These are all accredited to the University of California.

Normal Schools

There is a normal institute in Lodi, under the auspices of the Seventh Day Adventists. Children of all ages may attend.

Colleges

Two commercial schools are located in Stockton.

Catholic Schools

Two Roman Catholic schools, one for boys and one for girls, are located at Stockton.

LIBRARIES

Authority: News Notes of California, Vol. 7.

County Library

The San Joaquin County Library has headquarters at Stockton and branches in the following towns: Acampo, Christian Colony, Clements, Farmington, French Camp, Lathrop, Linden, Lockeford, Manteca, Moorland, Orchard, Ripon, Roberts Island, Thornton, Waterloo and Woodbridge.

Free Public Libraries

There are free public libraries at Stockton and Lodi. At Stockton there are also located a law library, a teachers' library and a library in connection with the high school.

Detailed information on the libraries of San Joaquin County is to be found in Vol. 7, News Notes of California Libraries, page 523, on file in library.

BANKS

TOWN	Name of Bank	Cashier	Paid-up Capital
Stockton	Commercial and Savings	E. F. Harris	$300,000
"	Farmers and Merchants	J. M. Abeel	500,000
"	First National Bank	F. A. Cramblitt	200,000
"	San Joaquin Valley	R. B. Teefy	264,300
"	Stockton Savings Bank	W. H. Lyons	400,000
"	Stockton Savings & Loan	T. E. Connolly	500,000
"	Union Safe Deposit	W. K. Gill	152,800
Lodi	Bank of Lodi	C. M. Ferdun	100,000
"	Central Savings Bank	W. H. Lorenz	25,000
"	First National Bank	W. H. Lorenz	100,000
Manteca	First State Bank	F. Norcross	25,000
Ripon	Bank of Ripon	H. L. Dickey	25,000
Tracy	Bank of Tracy	O. H. Root	75,000
"	West Side Bank	C. H. Sundquist	51,100
Escalon	Escalon State Bank	O. A. Fisk	25,000

LIST OF NEWSPAPERS PUBLISHED IN SAN JOAQUIN COUNTY

Stockton

DAILY

Stockton Evening Mail
Stockton Record
Stockton Independent
Daily Report

WEEKLY

Stockton Weekly Mail
Stockton Weekly Record
News Advocate
Weekly Tribune
Guard & Tackle
El Sole
Labor News

Tracy

Tracy Press (weekly)

Lodi

Lodi Post
Lodi Sentinel (three times a week)

Lockeford

Lockeford Reporter (weekly)

Manteca

Irrigation Bulletin (weekly)
Manteca Enterprise (weekly)

Ripon

Ripon Record (weekly)

Escalon

Escalon Tribune (weekly)

CHURCHES

Most of the small towns are well supplied with churches and nearly every denomination is represented in San Joaquin County. In the small towns and county districts where church buildings are not available services are held in the schoolhouses each Sunday. In the city of Stockton every denomination is represented.

Catholic
Lodi
Lockeford
Tracy
Linden
Lathrop

Christian
Lodi

Christian Science
Lodi

Congregational
Lodi
Bethany
Ripon
Manteca

Episcopal
Lodi

German Baptist
Lodi

German Lutheran
Lodi
Tracy

German Methodist
Tracy

Lutheran Reform
Lodi

Presbyterian
Clements
Woodbridge
Lockeford
Tracy
Escalon

Seventh Day Adventist
Lodi

Swedish Lutheran
Ripon
Escalon

United Brethren
Woodbridge
Ripon
Lathrop

TOWNS

Acampo

Acampo is a small town located about four miles north of Lodi. The population is 175. Acampo is tributary to Lodi for its trading. It has a small hotel, a store, blacksmith shop, stable and a fruit-packing house. The Southern Pacific railroad passes through the town. Rural free delivery mail routes start from this point.

Atlanta

Atlanta is a very small town located about fifteen miles southeast of Stockton on the Tidewater & Southern Railroad. A train passes each way every hour. There is no postoffice here at the present time.

Bellota

Bellota is located seventeen miles northeast of Stockton, at the convergence of the Calaveras River and Norman Fork. There is a store and postoffice here. The population of Bellota is 100.

To the east, where the foothills begin the soil is generally gravelly and shallow. Land is held in this vicinity at fifty dollars per acre and is used for grazing, except where an occasional patch of grain is produced. On the other side of the town, between the rivers, the soil is a river bottom sediment and the land is held at about $150 per acre.

The soil is suitable for vegetables, cherries, pears, etc.

Banta

Banta is on the Stockton-Tracy road and about three miles east of Tracy. It was formerly the chief town of the west side but when the railroad made Tracy a point of division the town of Banta ceased to grow as rapidly. The population of Banta is 143.

Bethany

Bethany is a small town located on the Southern Pacific railroad in the northwestern corner of the county, in the West Side section. The population is eighty. There is a Congregational church in the town and a school nearby.

Bethany has six warehouses and an oil pumping station.

Clements

Clements is a thrifty little town located at the base of the hills, twenty-one miles from Stockton and eleven miles from Lodi. Clements draws trade from the hill country, and is on the bank of the Mokelumne River at an elevation of 115 feet. The population of Clements is 333.

The town is on the branch of the Southern Pacific railroad running to Valley Springs and two passenger trains pass through each way daily.

One school is located here. There are two churches, Presbyterian and Methodist.

The soil to the south of Clements is shallow and gravelly, but to the north is river-bottom land. To the east are the hills. The river-bottom land is held at $300 per acre while the upland is held at about $100 per acre. The country is covered with oak trees.

There is one hotel here.

Escalon

Escalon is about twenty-one miles southeast of Stockton, in the eastern section of the South San Joaquin Irrigation District. An excellent macadamized highway connects the town with Stockton.

Escalon has a population of between 600 and 700 and is rapidly growing. About forty per cent. of the population is Swedish and there is a co-operative Swedish colonization society.

The Santa Fe Railroad passes through the town as does also the Tidewater & Southern, an electric line from Stockton to Modesto. Trains on this line pass each way every hour. Rural free delivery mail routes to the surrounding country start from this town.

There are three hotels in Escalon. A weekly newspaper is published here.

There are four churches in Escalon: Methodist, Presbyterian, Swedish Lutheran and Catholic.

Farmington

Farmington is almost directly east of Stockton and close to the foothills on Little John Creek. It is seventeen and one-half miles from Stockton over paved highway. The population is 263.

The town is situated on the branch of the Southern Pacific railroad which runs from Stockton to Oakdale. There are three passenger trains each way daily.

Farmington has one hotel.

There is a Methodist church and one school.

French Camp

French Camp is five miles south of Stockton on one of the main paved highways of the county. This road forks at this point, one branch leading to the San Francisco Bay cities and the other down the San Joaquin Valley. The population is 232.

French Camp is on the Southern Pacific and the Western Pacific railroads. There is one school here and a Methodist church.

French Camp is an historic place, situated on the old-time road to the mountains and mines.

Lathrop

Lathrop is situated at the junction of the Southern Pacific lines from San Joaquin Valley and Sacramento. The Western Pacific has a station about three-fourths of a mile from the town proper. There are paved highways running through the town. Lathrop is well equipped with electric power and telephones.

The population of the town is 350. There is one school and Catholic and United Brethren churches.

Linden

The town of Linden is located twelve miles northeast of Stockton, on the paved highway running from Stockton, and also on the line of the Stockton Terminal & Eastern Railroad, which runs two passenger trains and one freight train each way daily. The population is 150.

There is one hotel here. There are three churches in the town: North Methodist, South Methodist and Catholic. The town has one public school.

Lockeford

Lockeford is located seventeen miles northeast of Stockton and seven miles east of Lodi. It is on the south bank of the Mokelumne River. A branch line of the Southern Pacific running to Valley Springs passes through the town with train service twice each way daily. There are also two automobile stage lines with service each way between Stockton and Lockeford every day. Paved highways run in three directions.

The town is supplied with a school. There are three churches: Methodist, Presbyterian and Catholic. Lockeford has one hotel.

The section about Lockeford is considered a good part of the county. To the north the soil is river bottom. Much feed for cattle and hogs is raised. Across the river for a distance of about two miles the soil is a sediment loam of considerable depth but to the north of that becomes shallow and is underlaid with an impervious hardpan. To the west of Lockeford the soil is good, a sandy loam of varying depth but usually deep enough for fruit trees. To the south and east the soil grows poorer as one approaches the hills, although directly east along the river it is good.

The section produces wine and table grapes and various other kinds of fruits. It is however given largely to grain and cattle production. Scattering orange trees in this section produce well. The country is well covered with oak trees.

The population of Lockeford is 472.

Lodi

Lodi, the metropolis of northern San Joaquin county has a population of 4,000 and is situated in the heart of the grape district, twelve miles north of Stockton, on the main line of the Southern Pacific railroad and the Central California Traction line and has direct connection with the Santa Fe and Western Pacific roads, which gives splendid freight facilities.

Lodi is a beautiful modern city, surrounded by a highly developed fruit-farming section. The country is devoted to the production of grapes, cherries, peaches, apricots, almonds, oranges, alfalfa, poultry and small fruits.

Lodi has a very complete school system, consisting of two large grammar schools and a high school just completed at a cost of $150,000, and while the

school population is growing rapidly there is adequate accommodations for some time to come.

There are ten churches in the city and fourteen religious denominations are represented. St. Ann's Catholic church is one of the handsomest church edifices in San Joaquin County.

A Carnegie library is well equipped and well located in a beautiful brick building on West Pine Street, near the high school.

Lodi owns its own water and light plants and serves its citizens all the water they want at $1.50 per month, while the electric light rate is one of the cheapest in the State.

There are twenty-four blocks of paved streets in Lodi, the greater part of which are well lighted by beautiful electroliers along both sides of the streets. Lodi has the reputation of being the best lighted city of the Pacific Coast.

Gas is supplied for domestic purposes at a reasonable rate.

Lodi enjoys the distinction of being one of the healthiest cities in California, partly due to the extensive sewer system that covers the entire city.

During the past year building activities were very evident. The new Lodi Hotel building cost $100,000, while many smaller buildings were constructed. Building material is supplied by three lumber yards and two cement yards. Lodges and fraternal societies are well represented here and there is a local club, the "Mokelumne Club," which occupies the second floor of the new Bank of Lodi building and is a credit to any city of many times the size of Lodi.

A large Mission arch spans Pine Street near the Southern Pacific depot and adds beauty to the broad, well-kept streets.

Lodi has four banks, two newspapers and a number of small manufacturing plants, including a basket factory that turns out 30,000 fruit baskets daily during the shipping season, employing forty women and girls a large part of the year.

Manteca

Manteca is a new town situated in the South San Joaquin Irrigation District. The population is 400. The prospects for further growth and prosperity are very good.

Manteca is on the line of the South Pacific about eighty-five miles from San Francisco and fourteen miles from Stockton.

Manteca has as industries a tomato cannery, creamery and distributing substation for electric power.

There are two hotels in Manteca.

Two weekly newspapers are published. There is a new eight-room grammar school, a Union church and Christian Science church here.

Middle River

Middle River is on the line of the Santa Fe, about six miles below Holt, in the center of the potato section. An asparagus cannery is located here. The roads in this section are along the levees and difficult to travel. Middle River is one of the main shipping points of the island section.

Ripon

Ripon is located on the southern edge of the county near the Stanislaus River, on the Southern Pacific and on the paved highway running up the San Joaquin Valley to Stockton.

The population of Ripon is 500. There are two hotels. A weekly newspaper is published here.

There are three churches: United Brethren, Congregational and Swedish Mission.

About four miles north of Ripon is a private cannery which packs tomatoes and pickled olives.

Stockton

Stockton, the county-seat, is located in the center of San Joaquin County. The county extends about twenty-five miles in four directions from this city.

Macadamized roads radiate in all directions from Stockton, reaching to all parts of the county as well as up and down the great interior valleys of California and to the cities located about San Francisco Bay. These roads, together with the railroads, make it the trading center for a large area easily accessible from any portion of the State. Stockton is on the main line of the Southern Pacific, Santa Fe, Western Pacific railroads and the California Traction Company, Stockton Terminal & Eastern and Tidewater & Southern electric lines. The electric lines carry passengers and freight and operate cars in both directions every hour between Modesto and Stockton and Sacramento and Stockton and from the hill sections east of the city. There are also numerous automobile stages plying between the many towns of the county and Stockton and several launch lines that leave the center of the town at Channel Street and carry passengers and freight to any of the island landings of the Delta section.

The population of Stockton is approximately 40,000. The city has never experienced a "boom," but the growth has been steady and substantial in character. Stockton was one of the earliest cities founded in the State.

This city commands a large volume of business from the Delta region and from the extensive acreages of vegetable gardens in the vicinity of Stockton. There are a number of factories which run throughout the year and furnish employment to large numbers of people, manufacturing harvesters, dredges, gas engines, pumps and irrigation plants, tannery materials, sheet metal goods and boilers, glass, flour, etc. There are also a wool scouring plant, planing mills, brick yards, canneries, wineries, creameries and other small but no less important factories. All kinds of farming implements are also made in this town.

The Stockton State Hospital for the insane is located in this city.

Stockton churches represent all denominations.

There are schools of all grades, including two business colleges and a private normal school.

The city is well supplied with electric lights and power, theatres, street cars, paved streets, water system, and various public service needs.

Stockton has twelve good hotels, one of which costing one-half million dollars, was built by the citizens of Stockton.

The public library contains 70,000 volumes and there are twenty-four sub-libraries in the county, through which 66,000 volumes are handled during the year. The library has loan service with all the large libraries in California.

Thornton

Thornton is located in the northwestern corner of the county, and is the Western Pacific Station of the New Hope or Thornton District. It is located on the lower Stockton-Sacramento road, twenty-four miles from Stockton, twenty-seven miles from Sacramento and about seven miles from Galt, where is located the nearest high school.

The population is 200. There is one school in the town and church services are held in the schoolhouse each Sunday.

Tracy

Tracy is located in the center of the West Side grain country, seventy-five miles from San Francisco and twenty miles from Stockton. It is a thriving town of two thousand inhabitants.

Tracy is on the Southern Pacific railroad at the point where the main line from Niles and San Jose meets that from Martinez and Port Costa. All trains stop here and it is the transfer point for several lines. Here are located the round-house and car repair shops. These employ a large number of men. The town is on the main highway for automobiles from the Sacramento or San Joaquin valleys.

There are two hotels.

One weekly newspaper is published.

There is a grammar school and high school and five churches: Methodist, German Lutheran, Catholic, German Methodist and Presbyterian.

Tracy has a branch of the county free library. The streets are paved and the town owns it own water and sewer systems.

Waterloo

Waterloo, a small town, is located nine miles northeast of Stockton and has one store, a blacksmith shop and a hall. Church services are held in the hall each Sunday. The school is one mile distant as is also the electric railroad.

Holt

Holt is the largest town in the island country. It is located on Roberts Island, about nine miles from Stockton.

Holt is on the Santa Fe Railroad and is connected with Stockton by a paved highway. This road is to be extended across the islands to Byron. Holt is the big shipping point of the islands.

The population of the town is composed largely of Orientals. The stores are owned by Chinese and Japanese. There is one mercantile establishment run by an American.

Vernalis

Vernalis is on the West Side line of the Southern Pacific at the extreme southern edge of the county, fourteen miles south of Tracy. Here are located the pumping stations of the Standard Oil Company and of the Associated Oil Company, employing about twenty-three men. The population is seventy-five.

Woodbridge

Woodbridge is a small town located on the south bank of the Mokelumne River about three miles northwest of Lodi. This town has a population of 300.

Woodbridge is on the Stockton-Sacramento paved highway and the Southern Pacific railroad.

Here are located a grape-tartar factory which employs about eight men during the season, and a co-operative winery which employs ten men all the year around. The Woodbridge Irrigation District has its diverting dam and canal on the Mokelumne River near here.

There is one small hotel.

Woodbridge has two churches, United Brethren and Presbyterian. There is one school in the town.

SOURCES OF INFORMATION

Commercial Organizations

Town	Organization	Secretary
Escalon	Board of Trade	H. L. McPherson
Lockeford	Board of Trade	Dr. N. R. Barbour
Lodi	Chamber of Commerce of Northern San Joaquin County	M. O. Holt
Manteca	Board of Trade	J. B. Dixon
Ripon	Board of Trade	Karl A. Gotschall
Stockton	Merchants Association	E. B. Kientz
Stockton	Chamber of Commerce	John P. Irish, Jr.
Tracy	Board of Trade	Dr. Jos. S. West
Farmington	Board of Trade	V. M. Morrow

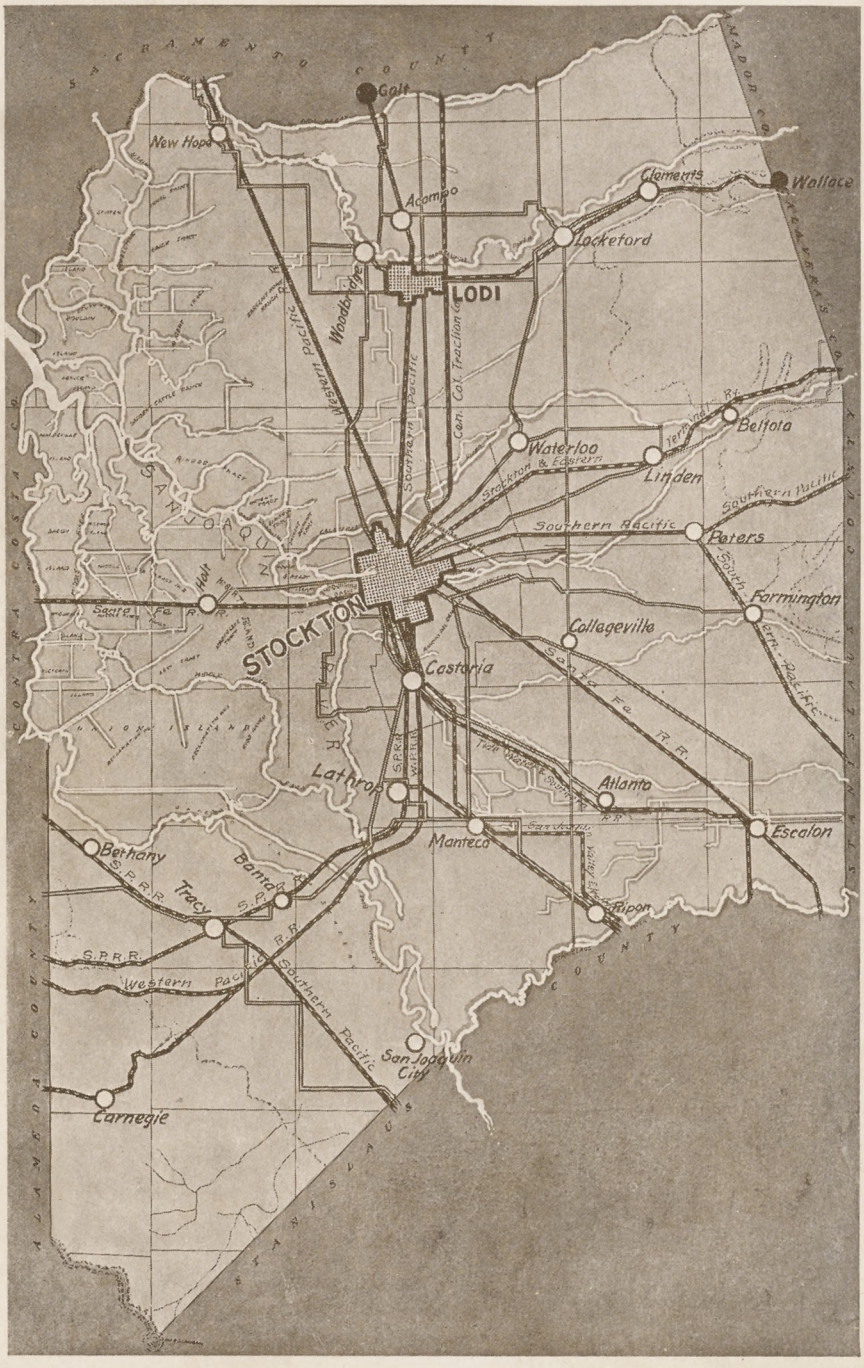
Reference List

Name	Address	Subject
C. A. Beecher	Stockton	Dairying
F. C. Brant	Stockton	Chicory
Carson Cook	Stockton	Hemp
J. B. Cory	Acampo	Apricots
O. Eccleston	Stockton	Celery
J. B. Fletcher	Stockton	Onions
Frankhenheimer Bros	Stockton	Grain
Wm. Garden	Stockton	Figs
Francis Harris	Manteca	Horses
Joe Levy	Manteca	Hogs
N. H. Locke	Lockeford	Dairying
E. M. McCausland	Lodi	Oranges
Charles Moring	Stockton	Grain
S. S. Murphy	Lodi	Almonds
F. B. Nims	Stockton	Beans
Mrs. Phillips	Lodi	Oranges
E. Powers	Manteca	Melons
H. W. Ruess	Middleriver	Asparagus
Frank Solari	Stockton	Cherries
T. J. Stephens	Stockton	Cherries
N. H. Stowe	Stockton	Dairying
Mr. Thornberry	Hotel Stockton	Horses
J. E. Thorpe	French Camp	Dairying
J. E. Thorpe	French Camp	Hogs
Sam Titus	Tracy	Horses
Louis Wagner	Stockton	Beef Cattle
C. T. Wiggins	Lathrop	Bees
E. L. Wilhoit	Stockton	Alfalfa
M. Wolff	Lathrop	Bees

FURTHER INFORMATION IN REGARD TO RAILROAD RATES, SERVICE, ETC., MAY BE OBTAINED BY WRITING TO

Chas. S. Fee, Passenger Traffic Manager, San Francisco, Cal.
F. E. Batturs, General Passenger Agent, San Francisco, Cal.
Jas. Horsburgh, General Passenger Agent, Los Angeles, Cal.
John M. Scott, General Passenger Agent, Portland, Oregon,

or by writing to or calling upon the nearest representative of the Southern Pacific Company.



THIS MAP SHOWS THE MARKETING CENTERS, THE RAILROADS, THE PAVED HIGHWAYS AND THE WATERWAYS OF SAN JOAQUIN COUNTY